



August 29, 2019

NOTICE OF MEETING – REQUEST FOR RSVPS

Members of the Joint Recycled Water Advisory Committee with Cities of East Palo Alto/Mtn. View/Palo Alto

Santa Clara Valley Water District:

Director Hon. Tony Estremera
Director Hon. Barbara Keegan
Director Hon. Gary Kremen, Chair

City of East Palo Alto:

Council Member Hon. Ruben Abrica

City of Mountain View:

Council Member Hon. Lucas Ramirez
Council Member Hon. Chris Clark, Alternate

City of Palo Alto:

Council Member Hon. Tom Dubois, Vice Chair
Council Member Hon. Alison Cormack, Alternate

Supporting Water District Staff Members:

Norma J. Camacho, Chief Executive Officer
Nina Hawk, Chief Operating Officer, Water Utility
Rick Callender, Chief of External Affairs
Darin Taylor, Chief Financial Officer
Stan Yamamoto, District Counsel
Brian Hopper, Senior Assistant District Counsel
Katherine Oven, Deputy Operating Officer, Water Utility Capital
Garth Hall, Deputy Operating Officer, Water Supply Division
Rachael Gibson, Deputy Administrative Officer, Office of Government Relations
Aaron Baker, Deputy Operating Officer, Raw Water Division
Jerry De La Piedra, Assistant Officer, Water Supply Division Deputy's Office
Hossein Ashktorab, Unit Manager, Recycled & Purified Water
Charlene Sun, Treasury and Debt Manager
Medi Sinaki, Senior Engineer
Miguel Silva, Associate Engineer (Civil)
Henry Barrientos, Associate Engineer (Civil)
Marta Lugo, Acting Unit Manager
Kristen Yasukawa, Supervising Program Administrator
Elise Latedjou-Durand, Senior Environmental Planner

Supporting City of Mountain View Staff Member:

Gregg Hosfeldt, Assistant Public Works Director
Ed Arango
Lisa Natusch, City Clerk
Wanda Wong, Deputy City Clerk

Supporting City of Palo Alto Staff Members:

Beth D. Minor, City Clerk
Phil Bobel, Assistant Director of Public Works Department
Karin North, Manager, Watershed Protection
Karla Dailey
Jessica Brettle, Assistant City Clerk

The regular meeting of the Santa Clara Valley Water District Joint Recycled Water Advisory Committee with Cities of East Palo Alto//Mtn. View/Palo Alto is scheduled to be held on **Thursday, September 5, 2019, at 12:00 p.m.**, in the **Valley Water, Headquarters Building Boardroom, 5700 Almaden Expressway, San Jose, CA 95118**

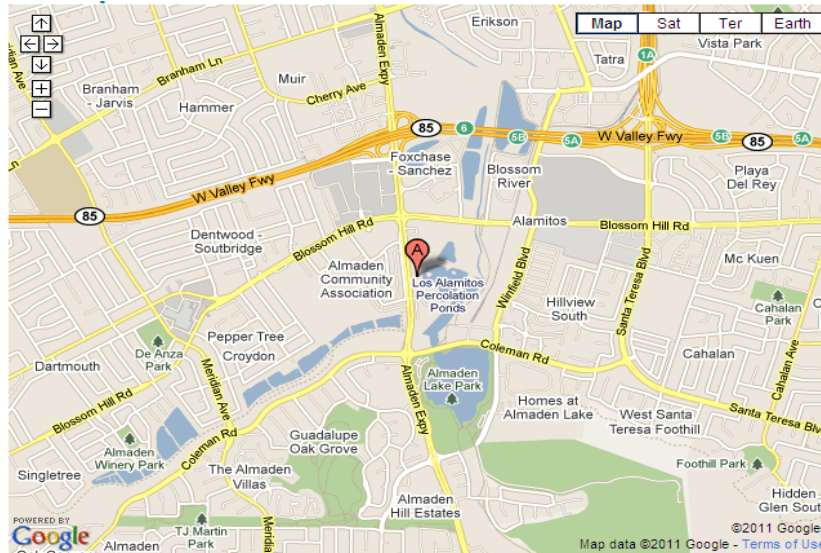
Enclosed for your convenience is a copy of the agenda and corresponding materials. Please bring these materials to the meeting with you.

Please RSVP at your earliest convenience by calling Glenna Brambill at 1-408-630-2408, or by email to gbrambill@valleywater.org, if you plan on attending the meeting.

Thank you!

Glenna Brambill
Management Analyst II
Santa Clara Valley Water District
Office of the Clerk of the Board
1-408-630-2408

**Santa Clara Valley Water District - Headquarters Building,
5700 Almaden Expressway, San Jose, CA 95118**



From Oakland:

- Take 880 South to 85 South
- Take 85 South to Almaden Expressway exit
- Turn left on Almaden Plaza Way
- Turn right (south) on Almaden Expressway
- At Via Monte (third traffic light), make a U-turn
- Proceed north on Almaden Expressway approximately 1,000 feet
- Turn right (east) into the campus entrance

From Morgan Hill/Gilroy:

- Take 101 North to 85 North
- Take 85 North to Almaden Expressway exit
- Turn left on Almaden Expressway
- Cross Blossom Hill Road
- At Via Monte (third traffic light), make a U-turn
- Proceed north on Almaden Expressway approximately 1,000 feet
- Turn right (east) into the campus entrance

From Sunnyvale:

- Take Highway 87 South to 85 North
- Take Highway 85 North to Almaden Expressway exit
- Turn left on Almaden Expressway
- At Via Monte (third traffic light), make a U-turn
- Proceed north on Almaden Expressway approximately 1,000 feet
- Turn right (east) into the campus entrance

From San Francisco:

- Take 280 South to Highway 85 South
- Take Highway 85 South to Almaden Expressway exit
- Turn left on Almaden Plaza Way
- Turn right (south) on Almaden Expressway
- At Via Monte (third traffic light), make a U-turn
- Proceed north on Almaden Expressway approximately 1,000 feet
- Turn right (east) into the campus entrance

From Downtown San Jose:

- Take Highway 87 - Guadalupe Expressway South
- Exit on Santa Teresa Blvd.
- Turn right on Blossom Hill Road
- Turn left at Almaden Expressway
- At Via Monte (first traffic light), make a U-turn
- Proceed north on Almaden Expressway approximately 1,000 feet
- Turn right (east) into the campus entrance

From Walnut Creek, Concord and East Bay areas:

- Take 680 South to 280 North
- Exit Highway 87-Guadalupe Expressway South
- Exit on Santa Teresa Blvd.
- Turn right on Blossom Hill Road
- Turn left at Almaden Expressway
- At Via Monte (third traffic light), make a U-turn
- Proceed north on Almaden Expressway approximately 1,000 feet
- Turn right (east) into the campus entrance

This Page Intentionally Left Blank



**Santa Clara Valley Water District
Joint Recycled Water Advisory Committee with
Cities of EPA, MTN VIEW & PA**

**HQ Boardroom
5700 Almaden Expressway
San Jose CA 95118**

**REGULAR MEETING
AGENDA**

**Thursday, September 5, 2019
12:00 PM**

District Mission: Provide Silicon Valley safe, clean water for a healthy life, environment and economy.

JOINT RECYCLED WATER POLICY
ADVISORY COMMITTEE W/ CITIES
OF EAST PALO ALTO & MOUNTAIN
VIEW & PALO ALTO

Gary Kremen - District 7, Committee
Chair

Tony Estremera - District 6
Barbara Keegan - District 2

All public records relating to an item on this agenda, which are not exempt from disclosure pursuant to the California Public Records Act, that are distributed to a majority of the legislative body will be available for public inspection at the Office of the Clerk of the Board at the Santa Clara Valley Water District Headquarters Building, 5700 Almaden Expressway, San Jose, CA 95118, at the same time that the public records are distributed or made available to the legislative body. Santa Clara Valley Water District will make reasonable efforts to accommodate persons with disabilities wishing to attend Board of Directors' meeting. Please advise the Clerk of the Board Office of any special needs by calling (408) 265-2600.

Note: The finalized Board Agenda, exception items and supplemental items will be posted prior to the meeting in accordance with the Brown Act.

Santa Clara Valley Water District
Joint Recycled Water Advisory Committee with Cities of EPA, MV, PA
REGULAR MEETING
AGENDA

Thursday, September 5, 2019

12:00 PM

HQ Boardroom
5700 Almaden Expressway, San Jose CA 95118

1. CALL TO ORDER:

1.1. Roll Call.

2. TIME OPEN FOR PUBLIC COMMENT ON ANY ITEM NOT ON THE AGENDA.

Notice to the public: This item is reserved for persons desiring to address the Committee on any matter not on this agenda. Members of the public who wish to address the Committee on any item not listed on the agenda should complete a Speaker Form and present it to the Committee Clerk. The Committee Chair will call individuals in turn. Speakers comments should be limited to two minutes or as set by the Chair. The law does not permit Committee action on, or extended discussion of, any item not on the agenda except under special circumstances. If Committee action is requested, the matter may be placed on a future agenda. All comments that require a response will be referred to staff for a reply in writing. The Committee may take action on any item of business appearing on the posted agenda.

3. APPROVAL OF MINUTES:

3.1. Approval of Minutes

[19-0817](#)

Recommendation: Approve the September 26, 2018, Meeting Minutes

Manager: Michele King, 408-630-2711

Attachments: [Attachment 1: 092618 Jt RWPAC Draft Mins](#)

Est. Staff Time: 5 Minutes

4. ACTION ITEMS:

4.1. Update on Northwest County Strategic Planning.

[19-0818](#)

Recommendation: Receive information and discuss next steps.

Manager: Jerry De La Piedra, 408-630-2257

Attachments: [Attachment 1: PowerPoint](#)
[Attachment 2: NW County RWSP Interim Final Report](#)

Est. Staff Time: 15 Minutes

- 4.2. Update on Countywide Water Reuse Master Plan and Reverse Osmosis Concentrate Management Plan. [19-0819](#)
Recommendation: Receive information and discuss next steps.
Manager: Jerry De La Piedra, 408-630-2257
Attachments: [Attachment 1: RWPC PowerPoint Sept 2019.pptx](#)
Est. Staff Time: 20 Minutes
- 4.3. Update on Partnership to Expand Water Reuse. [19-0820](#)
Recommendation: Receive information and discuss next steps regarding the development of a proposed partnership to expand water reuse.
Manager: Jerry De La Piedra, 408-630-2257
Attachments: [Attachment 1: Draft Partnership Term Sheet](#)
[Attachment 2: Draft Agreement Schedule](#)
[Attachment 3: PowerPoint Presentation](#)
Est. Staff Time: 20 Minutes
- 4.4. Next Meeting and Tentative Items. [19-0821](#)
Recommendation: Discuss and confirm next meeting date and tentative items.
Manager: Jerry De La Piedra, 408-630-2257
Est. Staff Time: 10 Minutes

5. CLERK REVIEW AND CLARIFICATION OF COMMITTEE REQUESTS.

This is an opportunity for the Clerk to review and obtain clarification on any formally moved, seconded, and approved requests and recommendations made by the Committee during the meeting.

6. ADJOURN:

- 6.1. Adjourn.

This Page Intentionally Left Blank



Santa Clara Valley Water District

File No.: 19-0817

Agenda Date: 9/5/2019
Item No.: 3.1.

COMMITTEE AGENDA MEMORANDUM

Joint RWPC with Cities of Palo Alto/E. Palo Alto/Mtn View

SUBJECT:

Approval of Minutes

RECOMMENDATION:

Approve the September 26, 2018, Meeting Minutes

SUMMARY:

A summary of Committee discussions, and details of all actions taken by the Committee, during all open and public Committee meetings, is transcribed and submitted for review and approval.

Upon Committee approval, minutes transcripts are finalized and entered into the District's historical records archives and serve as historical records of the Committee's meetings.

ATTACHMENTS:

Attachment 1: 092618 Jt RWPAC Meeting Minutes

UNCLASSIFIED MANAGER:

Michele King, 408-630-2711

This Page Intentionally Left Blank



**JOINT RECYCLED WATER ADVISORY COMMITTEE MEETING
(CITIES OF EAST PALO ALTO/MTN. VIEW/PALO ALTO/VW)**

DRAFT MINUTES

**TUESDAY, SEPTEMBER 26, 2018
11:00 AM**

(Paragraph numbers coincide with agenda item numbers)

A meeting of the Joint Recycled Water Advisory Committee (Committee) was held on September 26, 2018, in the Headquarters Building Boardroom at the Santa Clara Valley Water District (Valley Water), 5700 Almaden Expressway, San Jose, California.

1. CALL TO ORDER/ROLL CALL

A meeting of the Joint Recycled Water Committee was called to order by Chair Gary Kremen at 11:09 a.m.

Committee Members in attendance were: City of East Palo Alto Mayor/Council Member: Hon. Ruben Abrica; City of Mountain View Council Member: Hon. Pat Showalter; City of Palo Alto Council Members: Hon. Tom DuBois; Valley Water Directors: Hon. Tony Estremera, District 6, Hon Barbara Keegan, District 2 and Hon. Gary Kremen, District 7.

Valley Water Staff Members in attendance were: Hossein Ashktorab, Aaron Baker, Henry Barrientos, Glenna Brambill, Anthony Fulcher, Garth Hall, Luis Jaimes, Elise Latedjou-Durand, Marta Lugo, Medi Sinaki, Diahann Soleno and Charlene Sun.

City of Mountain View Staff Member in attendance was: Ed Arango.

City of Palo Alto Staff Members in attendance were: Phil Bobel, Karla Dailey and Karin North.

Guest Attendees: Hon. Peter Drekmeier and Stan Williams of Poseidon Water.

2. TIME OPEN FOR PUBLIC COMMENT ON ANY ITEM NOT ON AGENDA

There was no one present who wished to speak.

3. **APPROVAL OF MINUTES**

It was moved by Hon. Tom DuBois, seconded by Hon. Tony Estremera and carried, unanimously to approve the minutes of the March 6, 2018, Joint Recycled Water Committee meeting, as presented.

4. **ACTION ITEMS**

4.1 UPDATE ON COLLABORATIVE EFFORTS FOR WATER REUSE ALTERNATIVES IN NORTHWEST COUNTY

Mr. Garth Hall, Mr. Phil Bobel and Ms. Karin North reviewed the materials as outlined in the agenda item and were available to answer questions.

Director Gary Kremen, Hon. Pat Showalter, Hon. Tom DuBois had questions on revenue collected, brine, MGD numbers changing over time, recycled water, developmental impacts on water, potable and non-potable reuse, plant funding, sustainable water supply and further discussion on cost based vs valued based.

Ms. Karla Dailey of City of Palo Alto and Mr. Ed Arango from the City of Mountain View were available to answer questions.

No action was taken.

4.2 UPDATE ON NORTHWEST COUNTY RECYCLED WATER STRATEGIC PLAN

Mr. Hossein Ashktorab and Ms. Karin North reviewed the materials as outlined in the agenda item and were available to answer questions.

No action was taken.

4.3 UPDATE ON COUNTYWIDE WATER REUSE MASTER PLAN

Mr. Luis Jaimes reviewed the materials as outlined in the agenda item and discussed stakeholder meetings.

No action was taken.

4.4 UPDATE ON REVERSE OSMOSIS CONCENTRATE MANAGEMENT (ROCM) PROJECT

Mr. Medi Sinaki reviewed the materials as outlined in the agenda item.

No action was taken.

4.5 NEXT MEETING AND TENTATIVE ITEMS

The Committee agreed to schedule the next meeting Monday, October 29, 2018, 11:00 a.m.

No action was taken.

5. CLERK REVIEW AND CLARIFICATION OF COMMITTEE REQUESTS AND RECOMMENDATIONS

Board Committee Liaison Ms. Glenna Brambill reported there were no action items for consideration.

6. ADJOURNMENT

Chair Director Gary Kremen adjourned the meeting at 1:11 p.m.

Glenna Brambill
Board Committee Liaison
Office of the Clerk of the Board

Approved:

This Page Intentionally Left Blank



Santa Clara Valley Water District

File No.: 19-0818

Agenda Date: 9/5/2019

Item No.: 4.1.

COMMITTEE AGENDA MEMORANDUM

Joint RWPC with Cities of Palo Alto/E. Palo Alto/Mtn View

SUBJECT:

Update on Northwest County Strategic Planning.

RECOMMENDATION:

Receive information and discuss next steps.

SUMMARY:

This agenda item provides an update to the Joint Recycled Water Committee and describes the completion of the Northwest County Recycled Water Strategic Plan.

Northwest County Recycled Water Strategic Plan

On July 26, 2016, the Board of Directors of the Santa Clara Valley Water District (Valley Water) approved a cost sharing agreement between the City of Palo Alto and Valley Water to support the development of the Northwest County Recycled Water Strategic Plan (Strategic Plan). The Strategic Plan was tasked to evaluate expansion opportunities for the recycled water system associated with the Regional Water Quality Control Plant (RWQCP) in Palo Alto.

To support evaluation of expansion opportunities, a detailed study of local groundwater conditions in the northwest Santa Clara County was performed to assess local hydrogeology and opportunities for groundwater augmentation with advanced purified water. A comprehensive analysis of potential recycled water supply and demand was performed for the RWQCP service area to identify potential recycled water users. Preliminary design and financial planning were performed to develop project costs and identify potential funding opportunities.

The Strategic Plan evaluated a number of non-potable (NPR), indirect potable (IPR), and direct potable reuse alternatives within the RWQCP service area, including the possibility of implementing treated water augmentation, or the introduction of advanced purified water directly into the treated water distribution system. Alternatives were evaluated and ranked based on cost and non-cost criteria.

Results of the analysis indicate that NPR opportunities within the RWQCP service area could yield between 200 and 1,200 acre-feet (AF) per year (AFY) at a cost ranging from \$2,100/AF to \$4,600/AF. IPR opportunities could yield up to 5,900 AFY at a cost ranging from \$3,300/AF to \$4,400/AF. Raw water augmentation opportunities could yield up to 5,300 AFY and cost approximately \$2,500/AF. Implementation of alternatives may be subject to further studies, recycled water availability, and the results of the Countywide Water Reuse Master Plan.

The interim final report of the Strategic Plan (Attachment 2) was released to stakeholders on August 19, 2019 and will be presented to the Palo Alto City Council in early 2020 for acceptance.

A copy of the interim final report and associated appendices can be found on the project's website:
<https://www.cityofpaloalto.org/gov/depts/utl/residents/resources/water_resources/recycled_water.asp>

Next Steps

The Strategic Plan project team will complete a financial assistance application with the Clean State Revolving Fund program to seek a low-interest loan to complete the design and construction of the local Advanced Water Purification Facility.

In addition, City of Palo Alto, City of Mountain View, and Valley Water staff will continue to work on siting evaluations to inform selection of suitable sites for a future regional advanced water purification facility. Information generated as part of the siting study will inform 10% design deliverables being developed by the Countywide Water Reuse Master Plan.

ATTACHMENTS:

Attachment 1: PowerPoint

Attachment 2: Northwest County Recycled Water Strategic Plan - Interim Final Report

UNCLASSIFIED MANAGER:

Jerry De La Piedra, 408-630-2257

Update on Northwest County Strategic Planning

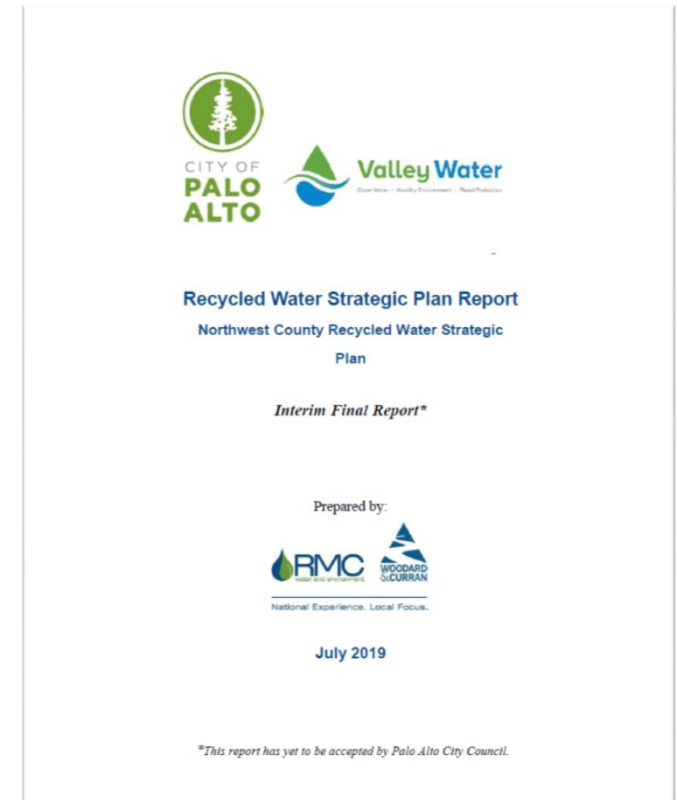


Valley Water

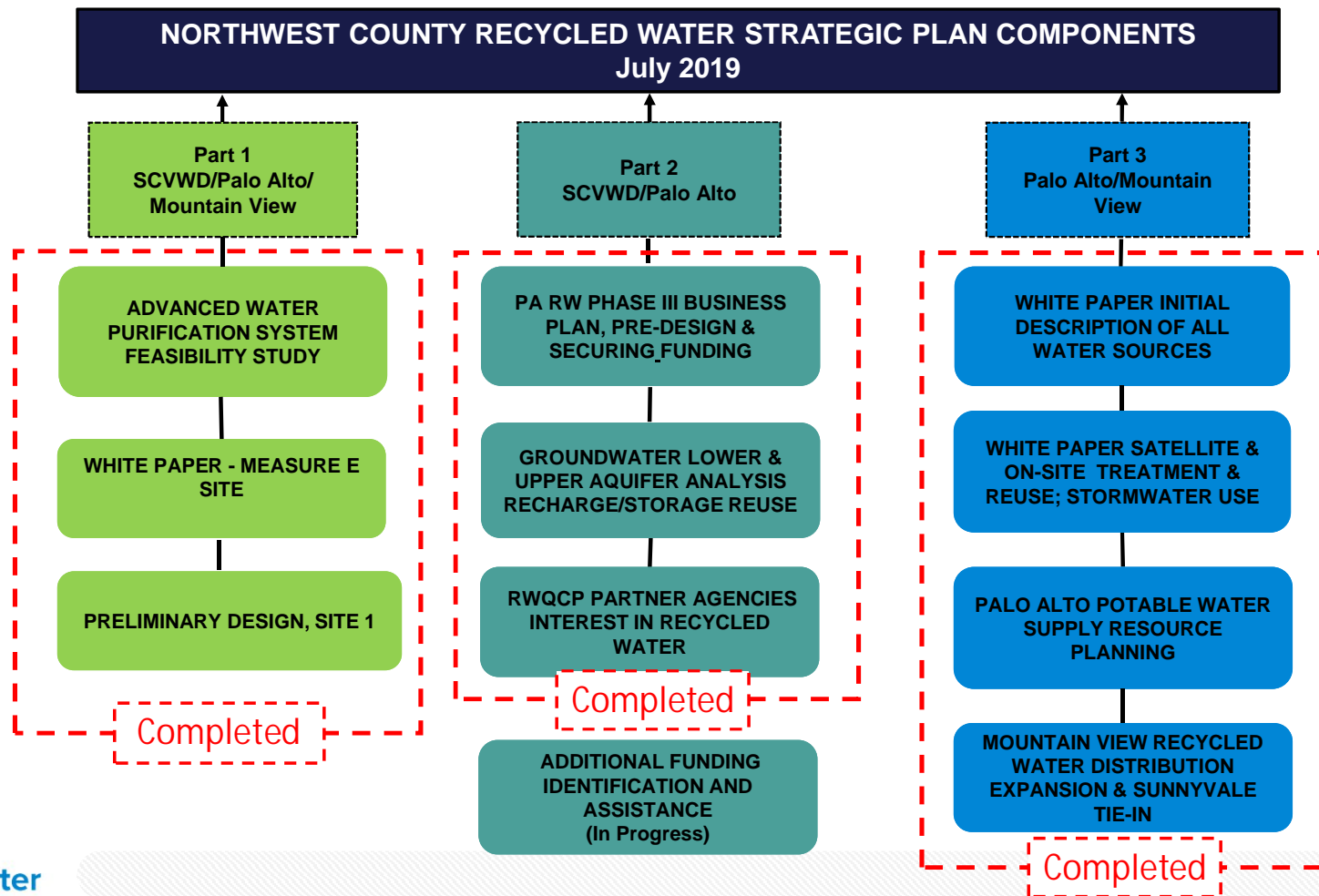
Clean Water • Healthy Environment • Flood Protection

Northwest County Recycled Water Strategic Plan

- How best to expand Palo Alto Regional Water Quality Control Plant (RWQCP) Recycled Water Program given:
 - Recent regulatory developments
 - Prolonged drought
 - 1992 Recycled Water Master Plan recommended projects
- Study Area:
 - RWQCP service area
 - Additional areas within Menlo Park & East Palo Alto
- Time Period:
 - Through 2030



Northwest County Recycled Water Strategic Plan



Northwest County Recycled Water Strategic Plan

Water Reuse Opportunities



Countywide Water Reuse Master Plan

Regional Intererties

NW County Recycled Water Strategic Plan

Non-potable Reuse

Satellite Non-potable Reuse

Indirect Potable Reuse

Direct Potable Reuse



Northwest County Recycled Water Strategic Plan

Non-Potable Reuse (NPR) (excluding satellite)

- \$6M - \$85M for infrastructure
- \$2,100 - \$4,600/AF



Indirect Potable Reuse (IPR)

- \$92M - \$198M for infrastructure
- \$3,300 - \$4,400/AF



Direct Potable Reuse (DPR)

- \$105M for infrastructure
- \$2,500/AF



Northwest County Strategic Planning – Next Step

- Continue to explore opportunities to develop water reuse in Northwest County.
- Provide input into Countywide Water Reuse Master Plan.
- Develop interagency agreements.



Recycled Water Strategic Plan Report

Northwest County Recycled Water Strategic Plan

*Interim Final Report**

Prepared by:



National Experience. Local Focus.

July 2019

**This report has yet to be accepted by Palo Alto City Council.*

Table of Contents

Executive Summary i

Chapter 1 Introduction 1-1

 1.1 *Background and Purpose of the Recycled Water Strategic Plan*..... 1-1

 1.2 *Organization of this Report*..... 1-4

 1.3 *Study Area*..... 1-4

Chapter 2 Recycled Water Demand Assessment 2-1

 2.1 *Recycled Water Uses* 2-1

 2.2 *Non-Potable Uses* 2-3

 2.3 *Indirect Potable Uses* 2-7

 2.4 *Direct Potable Uses*..... 2-8

 2.5 *Other Potential Uses Outside of Study Area*..... 2-9

Chapter 3 Strategic Plan Concept Options 3-1

 3.1 *Summary of Approach*..... 3-1

 3.2 *Concept Option Development Process*..... 3-1

 3.3 *Concept Options A: NPR from RWQCP* 3-5

 3.4 *Concept Option B: NPR from Satellite Location*..... 3-21

 3.5 *Concept Option C: IPR Concept Options*..... 3-24

 3.6 *Concept Option D: DPR Concept Options* 3-33

Chapter 4 Strategic Plan Concept Options Evaluation 4-1

 4.1 *Approach for Concept Options Evaluation*..... 4-1

 4.2 *Basis of Preliminary Cost Estimate*..... 4-1

 4.3 *Engineer’s Opinion of Probable Cost Summary*..... 4-6

 4.4 *Concept Option Evaluation Non-Cost Criteria*..... 4-7

 4.5 *Concept Option Scoring*..... 4-18

Chapter 5 Conclusions and Next Steps 5-1

 5.1 *Conclusions*..... 5-1

 5.2 *Next Steps*..... 5-4

References 5-6

Appendices

Appendix A - Non-Potable Demand Assessment Methodology A

Appendix B - Recycled Water Customers and Demand Estimates [Confidential – Not Included] B

Appendix C - Potential Uses Considered but Not Included C

Appendix D - Opinions of Probable Costs D

Appendix E - Concept Option Variations [Confidential – Not Included] E

Appendix F - Cost Per Unit of Water Analyses for Palo Alto, Cal Water, Purissima Hills Water District and East Palo Alto [Confidential – Not Included] F

Appendix G - Funding Matrix G

Figures

Figure ES-0-1: Potential recycled water uses for both potable and non-potable reuse applications ii

Figure 1-1: Study Area 1-1

Figure 1-2: RWQCP Existing Water Reuse System 1-2

Figure 1-3: Proposed Phase 3 Recycled Water Project..... 1-3

Figure 1-4: Water Retailers (names indicated in black text)..... 1-6

Figure 2-1: Overview of Non-Potable and Potable Reuse Types..... 2-1

Figure 2-2: Overview of Non-Potable and Potable Reuse Types included in this Recycled Water Strategic Plan..... 2-2

Figure 2-3: Potential Non-Potable Users in Study Area..... 2-6

Figure 3-1: Summary of Overall Approach to Strategic Plan Concept Option Development and Assessment..... 3-1

Figure 3-2: Alignment for Concept Option A1, NPR Palo Alto Phase 3 3-7

Figure 3-3: Alignment for Concept Option A2, NPR Palo Alto Phase 3 Extended to Foothills.. 3-9

Figure 3-4: Alignment for Concept Option A3, NPR Palo Alto Phase 3 Extended to Foothills and Los Altos 3-12

Figure 3-5: Alignment for Concept Option A4, NPR Mountain View 3-15

Figure 3-6: Alignment for Concept Option A5, NPR Mountain View Extended to Los Altos ... 3-18

Figure 3-7: Alignment for Concept Option A6, NPR East Palo Alto and Menlo Park..... 3-20

Figure 3-8: Alignment for Concept Option B1, NPR Satellite Treatment Plant..... 3-23

Figure 3-9: Alignment for Concept Option C1, Palo Alto Dedicated IPR..... 3-26

Figure 3-10: Alignment for Concept Option C2, Palo Alto IPR with NPR 3-29

Figure 3-11: Alignment for Concept Option C3, Palo Alto IPR and NPR from Phase 3 Pipeline 3-32

Figure 3-12: Alignment for Concept Option D1, Palo Alto Dedicated DPR 3-35

Tables

Table ES-0-1: Summary of Demand Potential by Type of Water Reuse..... ii

Table ES-0-2: Summary of Concept Options including Yield, Engineer’s Opinion of Probable Capital and O&M Costs iv

Table ES-0-3: Ranking of Concept Options by Cost..... v

Table ES-0-4: Ranking of Concept Options by Non-Cost Criteria..... v

Table ES-0-5: Ranking Considering Cost and Non-Cost Evaluation Criteria vi

Table 1-1: Summary of Water Supply Sources and Needs..... 1-8

Table 2-1: Summary of Recycled Water Interests 2-3

Table 2-2: Demand Peaking Factors..... 2-5

Table 2-3: Non-Potable Demand Summary..... 2-5

Table 2-4: IPR Demand and Groundwater Project Yield Summary 2-8

Table 2-5: DPR Demand Estimate Summary 2-9

Table 3-1: Hydraulic Criteria..... 3-3

Table 3-2: Maximum AWTs Sizes Without Requiring Reverse Osmosis Concentrate Treatment 3-5

Table 3-3: Demand and Facility Summary for Concept Option A1, NPR Palo Alto Phase 3 3-6

Table 3-4: Demand and Facilities Summary for Concept Option A2, NPR Palo Alto Phase 3 Extended to Foothills 3-8

Table 3-5: Demand and Facilities Summary for Concept Option A3, NPR Palo Alto Phase 3 Extended to Foothills and Los Altos 3-11

Table 3-6: Demand and Facilities Summary for Concept Option A4, Mountain View..... 3-14

Table 3-7: Demand and Facilities Summary of Concept Option A5, NPR Mountain View Extended to Los Altos 3-17

Table 3-8: Demand and Facilities Summary for Concept Option A6, NPR East Palo Alto and Menlo Park..... 3-19

Table 3-9: Demand and Facilities Summary for Concept Option B1, NPR Satellite Treatment Plant..... 3-22

Table 3-10: Demand and Facilities Summary for Concept Option C1, Palo Alto Dedicated IPR 3-24

Table 3-11: Demand and Facilities Summary for Concept Option C2, Palo Alto IPR with NPR. 3-28

Table 3-12: Demand and Facilities Summary for Concept Option C3, Palo Alto IPR and NPR from Phase 3 Pipeline 3-31

Table 3-13: Demand and Facilities Summary for Concept Option D1, Palo Alto Dedicated DPR 3-34

Table 4-1: Unit Cost of HDPE Pipe 4-4

Table 4-2: Special Crossing Unit Costs 4-5

Table 4-3: Summary of Engineer’s Opinion of Probable Capital and O&M Costs 4-7

Table 4-4: Concept Option Scores for Water Supply Resiliency 4-8

Table 4-5: Concept Option Scores for Public Acceptance 4-9

Table 4-6: Concept Option Scores for Adaptability 4-10

Table 4-7: Concept Option Scores for Level of Agency Coordination 4-11

Table 4-8: Concept Option Scores for Level of Customer Retrofits/Coordination 4-12

Table 4-9: Concept Option Scores for Regulatory Complexity..... 4-13

Table 4-10: Concept Option Scores for Institutional Complexity 4-14

Table 4-11: Concept Option Scores for Regional Perspective 4-16

Table 4-12: Concept Option Scores for Social and Economic Benefit 4-17

Table 4-13: Concept Option Scores for Environmental Benefit..... 4-18

Table 4-14: Non-Cost Criteria Weighting 4-19

Table 4-15: Non-Cost Ranking 4-19

Table 4-16: Ranking of Concept Options by Cost..... 4-20

Table 4-17: Combined Weighting Including both Cost and Non-Cost Criteria..... 4-21

Table 4-18: Combined Ranking Considering Cost at 30% of the Score..... 4-21

Table 5-1: Summary of Demand Potential by Type of Water Reuse..... 5-1

Table 5-2: Summary of Engineer’s Opinion of Probable Capital and O&M Costs 5-1

Table 5-3: Recommended Next Steps for Type of Opportunity 5-5

Abbreviations

AACE	Association for the Advancement of Cost Engineering
AF	Acre feet
AFY	Acre feet per year
AOP	Advanced oxidation process
AWPF	Advanced water purification facility [for potable reuse]
AWTS	Advanced water treatment system [for enhanced recycled water]
CCI	Construction cost index
CIP	Cast iron pipe
CIPP	Cured in place pipe
DDW	Division of Drinking Water
DIP	Ductile iron pipe
DPR	Direct potable reuse
ENR	Engineering News Record
EPASD	East Palo Alto Sanitary District
ESDC	Engineering services during construction
FAT	Full advanced treatment
gpm	Gallons per minute
HDD	Horizontal directional drill
HGL	Hydraulic grade line
HP	Horsepower
ID	Internal diameter
IPR	Indirect potable reuse
LF	Linear feet
MF	Membrane filtration
MGD	Million gallons per day
MV	Mountain View
NPR	Non-potable reuse
OD	Outside diameter
O&M	Operations and maintenance
PHWD	Purissima Hills Water District
psi	Pressure per square inch
PTGAB	Pilot tube guided auger boring
RO	Reverse osmosis

RWQCP	Regional Water Quality Control Plant
RWMP	Recycled Water Master Plan
SFPUC	San Francisco Public Utilities Commission
SWRCB	State Water Resources Control Board
TDS	Total dissolved solids
UV	Ultraviolet
UWMP	Urban Water Management Plan
WBSD	West Bay Sanitary District

Executive Summary

The Northwest County Recycled Water Strategic Plan (Strategic Plan) was undertaken by the City of Palo Alto, in collaboration with Valley Water, to assess drought-proof recycled water expansion opportunities throughout the Palo Alto Regional Water Quality Control Plant (RWQCP) service area (i.e., Palo Alto, Mountain View, Los Altos, Los Altos Hills, Stanford University, and East Palo Alto Sanitary District) including additional portions of East Palo Alto and Menlo Park not serviced by the East Palo Alto Sanitary District.

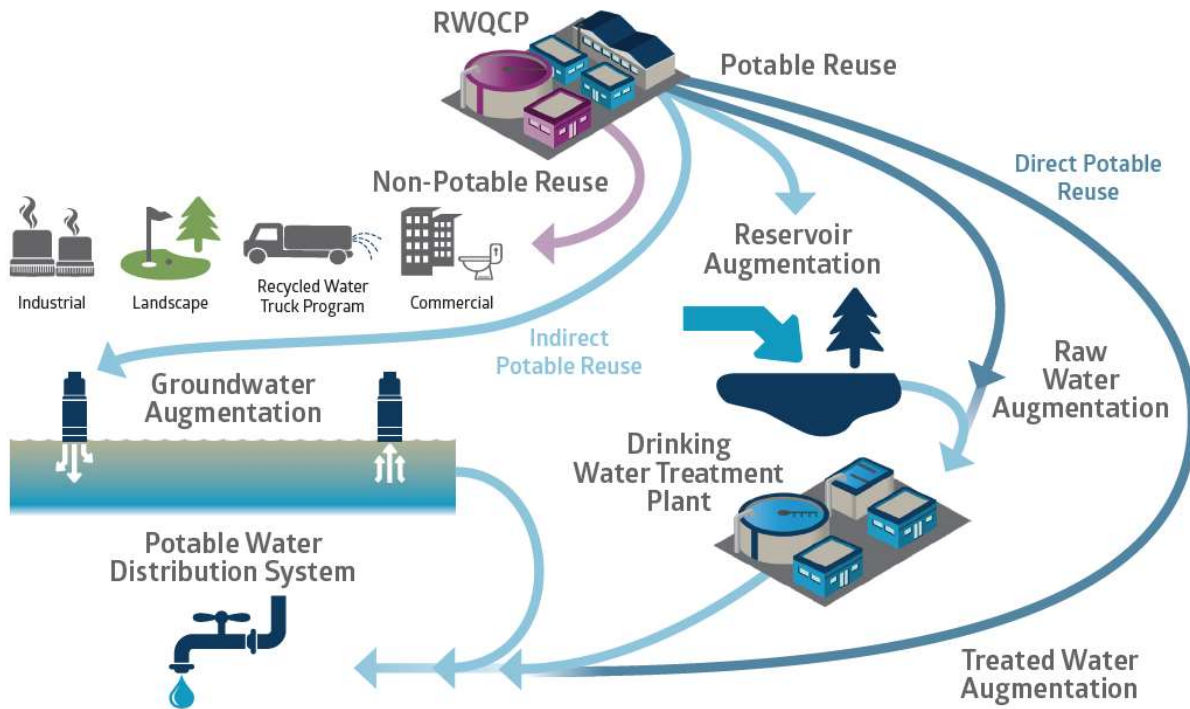
To aid in future decisions regarding RWQCP recycled water expansion and commitments, Palo Alto, as the owner and operator of the RWQCP, saw a need to assess other RWQCP Partner Agencies' interests in recycled water. The RWQCP is interested in expanding the recycled water program to help move itself towards becoming a resource recovery facility by providing a drought-proof, sustainable, local water supply, and for recycled water's potential to help meet future regulatory actions pertaining to discharge limitations. Palo Alto, similar to many of the other RWQCP Partner Agencies', is subject to water supply reductions during droughts. Shortages are expected to become more frequent and more severe in the future as a result of climate change and other changes to the California water system. Both imported water and groundwater are at risk during dry periods. In order to understand how to best expand the RWQCP recycled water program, a comprehensive and holistic evaluation was needed to reassess the service area needs and acceptance given changes in water supplies and governing regulations.

The purpose of the Strategic Plan is to evaluate potential additional uses of recycled water Study Area through the year 2030, to identify recycled water concepts that look beyond individual agency boundaries, and to evaluate previously recommended recycled water projects with new options developed through this Strategic Plan.

Types of Water Reuse Considered

The Strategic Plan builds off of the work from the 1992 Recycled Water Master Plan (RWMP) to incorporate options for new and different kinds of reuse. Recycled water can be used for various demands based on its level of treatment. Non-potable reuse, such as that for irrigation or toilet flushing, requires more treatment than wastewater that is treated for discharge to the Bay. Similarly, potable reuse requires significantly more treatment than non-potable reuse to ensure public safety when ingesting the water.

Figure ES-0-1: Potential recycled water uses for both potable and non-potable reuse applications



Note: City of Palo Alto does not have an existing Drinking Water Treatment Plant

The potential reuse demand for the various types of water reuse considered in the Strategic Plan is summarized in Table ES 0-1.

Table ES-0-1: Summary of Demand Potential by Type of Water Reuse

Type of Reuse	Annual Average Demand	Comments
Non-Potable Reuse	4,456 AFY	Throughout RWQCP service area, not one specific concept
Indirect Potable Reuse	2,800 / 5,900 AFY	For City of Palo Alto only
Direct Potable Reuse	5,300 AFY	For City of Palo Alto only

Note: IPR annual average demand reflects volume recharged to the groundwater basin and volume extracted from the groundwater basin

Results of Concept Options Development and Analysis

Through collaborative development with the RWQCP Partner Agencies, water retailers, and neighboring agencies, 11 concept options (i.e., recycled water expansion opportunities) were developed for detailed analysis in the Strategic Plan. In summary, the concept options could provide between 200 and 6,100 AFY of water supplies at an annual unit cost ranging from \$2,100 per AF to \$8,900 per AF (see Table ES 0-2). For comparison with other non-water reuse water supplies, potable water from SFPUC is projected

to cost \$3,000 per AF in 2030, and groundwater, including wellhead treatment and the Valley Water groundwater pumping charge, is projected to cost \$3,000 per AF.¹

To provide a basis for comparison, cost estimates reflect the incremental cost of pursuing each concept option. For the NPR options, the cost estimates include distribution to the end-user. Consistent with the incremental cost methodology, this report does not estimate the total cost of providing the IPR or DPR water to end-users as Palo Alto's existing potable water distribution system costs are not included in the estimates.

The concept options were selected based on cost effectiveness and applicability to solving regional water supply issues. The concept options are divided into four categories:

- “A” series for centralized non-potable reuse (NPR) concept options
- “B” concept option for NPR from satellite treatment
- “C” series for indirect potable reuse (IPR) concept options
- “D” concept option for direct potable reuse (DPR)

The concept options were evaluated for capital and operational costs and scored on a variety of non-cost criteria including water supply resiliency, public acceptance, adaptability, regulatory complexity, and regional perspective. Concept option ranking by cost is included in Table ES 0-3. Concept option ranking by non-cost criteria is included in Table ES 0-4. The summary of weighted ranking of concept options including both cost and non-cost criteria is included in Table ES 0-5.

NPR concept options evaluated multiple pipeline extensions throughout the Study Area. **Concept Option A2, NPR Palo Alto Phase 3 Extended to Foothills** ranks highly because it delivers among the largest volumes of the NPR concept options and strikes a balance between offering regional benefits while requiring few agencies to implement and operate.

NPR is challenging for Los Altos and Los Altos Hills because their customers are located furthest from the RWQCP and existing recycled water infrastructure and coordination with the Partner Agencies upstream would be needed. Between the two options to serve Los Altos – **Concept Option A3, NPR Palo Alto Phase 3 Extended to Foothills and Los Altos** (which builds off of Concept Option A1) and **Concept Option A5, NPR Mountain View Extended to Los Altos** (which builds off of Concept Option A4) – Concept Option A3 is preferred due to preliminary costs. Between the two options to serve Los Altos Hills - **Concept Option A2, NPR Palo Alto Phase 3 Extended to Foothills** and **Concept Option A3, NPR Palo Alto Phase 3 Extended to Foothills and Los Altos** – Concept Option A2 is ranked higher.

Concept Option A4, NPR Mountain View, was previously recommended in the 2014 Mountain View Recycled Water Feasibility Study, due to its low cost and average non-cost score, was determined to be a reasonable investment compared to the other concept options explored in the Strategic Plan. Currently (July 2019), Mountain View is in the process of updating the 2014 Recycled Water Feasibility Study focusing on extending their existing system to Google and NASA, and across Highway 101; this update may alter the facility needs and costs for Concept Option A4.

Concept Option A6, NPR East Palo Alto, is low cost, and the average non-cost score make it a reasonable investment compared to other concept options.

The **IPR concept options** are attractive due to the large amount of water supplied combined with greater ability to repurpose the infrastructure and only one agency required to implement and operate.

¹ These are the estimated costs to the City of Palo Alto of purchasing SFPUC water or pumping groundwater and these cost estimates do not include distribution system costs.

Concept Option D1, Palo Alto Dedicated DPR delivers the greatest volume of recycled water out of all the concept options, requires only one agency to implement and operate, and does not require infrastructure changes by customers. The notable drawback of Concept Option D1 is the implementation process. Given the lack of established regulations, pursuing a DPR project at this time would require more effort by Palo Alto to establish a process that regulatory agencies will permit. Even when DPR regulations are established, the hurdles that agencies must clear to permit DPR projects will likely be more challenging compared to other recycled water projects. Another challenge will be hiring/training staff to operate the new treatment facilities.

The presumed benefit of **Concept Option B1, NPR Satellite Treatment Plant** was the ability to create a compact recycled water distribution system closer to the customer locations rather than requiring an extensive pipe network extending from the RWQCP. However, in this setting, the preferred location for diverting flows from the sewer system does not correspond to the areas of potential recycled water nor is there land available in the immediate vicinity of the diversion point to site a satellite treatment facility that is cost effective.

Table ES-0-2: Summary of Concept Options including Yield, Engineer's Opinion of Probable Capital and O&M Costs

Concept Option	Yield (AFY)	Capital Cost	O&M (\$/Y)	Unit Cost (\$/AF)
A1: NPR Palo Alto Phase 3	800	\$47.8M	\$0.29M	\$3,400
A2: NPR Palo Alto Phase 3 Extended to Foothills	1,100	\$63.0M	\$0.52M	\$3,400
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	1,200	\$85.1M	\$0.68M	\$4,000
A4: NPR Mountain View	200	\$6.2M	\$0.1M	\$2,100
A5: NPR Mountain View Extended to Los Altos	900	\$72.6M	\$0.4M	\$4,600
A6: NPR East Palo Alto	500	\$20.7M	\$0.15M	\$2,400
B1: NPR Satellite Treatment Plant	900	\$129.6M	\$1.37M	\$8,900
C1: Palo Alto Dedicated IPR	5,900	\$92.2M	\$14.83M	\$3,300
C2: Palo Alto IPR with NPR	6,100	\$152.1M	\$16.92M	\$4,000
C3: Palo Alto IPR and NPR from Phase 3 Pipeline	5,900	\$198.4M	\$15.78M	\$4,400
D1: Palo Alto Dedicated DPR	5,300	\$104.6M	\$8.01M	\$2,500

Note: Costs based on an ENR CCI San Francisco index for June 2018 of 12,015. Costs are consistent with a Class 5 estimate (-20% to +50%) (AACE 2008). Capital costs are amortized at 3% over 30 years.

Table ES-0-3: Ranking of Concept Options by Cost

Rank	Score	Concept Option
1	5 (<\$3,500/AF)	A1: NPR Palo Alto Phase 3
		A2: NPR Palo Alto Phase 3 Extended to Foothills
		A4: NPR Mountain View
		A6: NPR East Palo Alto
		C1: Palo Alto Dedicated IPR
		D1: Palo Alto Dedicated DPR
2	3 (≥\$4,000/AF and <\$4,500/AF)	A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos
		C2: Palo Alto IPR with NPR
		C3: Palo Alto IPR and NPR from Phase 3 Pipeline
3	2 (≥\$4,500/AF and <\$5,000/AF)	A5: NPR Mountain View Extended to Los Altos
4	1 (≥\$5,000/AF)	B1: NPR Satellite Treatment Plant

Table ES-0-4: Ranking of Concept Options by Non-Cost Criteria

Rank	Score (Maximum = 500)	Concept Option
1	291	A2: NPR Palo Alto Phase 3 Extended to Foothills
2	290	C1: Palo Alto Dedicated IPR
3	289	C2: Palo Alto IPR with NPR
	289	C3: Palo Alto IPR and NPR from Phase 3 Pipeline
4	286	A5: NPR Mountain View Extended to Los Altos
5	285	A1: NPR Palo Alto Phase 3
	285	A4: NPR Mountain View
	285	A6: NPR East Palo Alto
6	282	A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos
7	271	B1: NPR Satellite Treatment Plant
8	269	D1: Palo Alto Dedicated DPR

Table ES-0-5: Ranking Considering Cost and Non-Cost Evaluation Criteria

Rank	Concept Option
1	A2: NPR Palo Alto Phase 3 Extended to Foothills
	C1: Palo Alto Dedicated IPR
2	A1: NPR Palo Alto Phase 3
	A4: NPR Mountain View
	A6: NPR East Palo Alto
3	D1: Palo Alto Dedicated DPR
4	C2: Palo Alto IPR with NPR
5	A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos
6	C3: Palo Alto IPR and NPR from Phase 3 Pipeline
7	A5: NPR Mountain View Extended to Los Altos
8	B1: NPR Satellite Treatment Plant

Next Steps

Results of the Strategic Plan indicate that there are multiple water reuse expansion opportunities within the Study Area that agencies could pursue, including NPR, IPR, and DPR. Next steps would include undertaking a variety of activities including:

- Facilities planning
- Funding and financing
- Inter-agency agreements
- Environmental documentation
- Reuse permitting
- Customer and public outreach

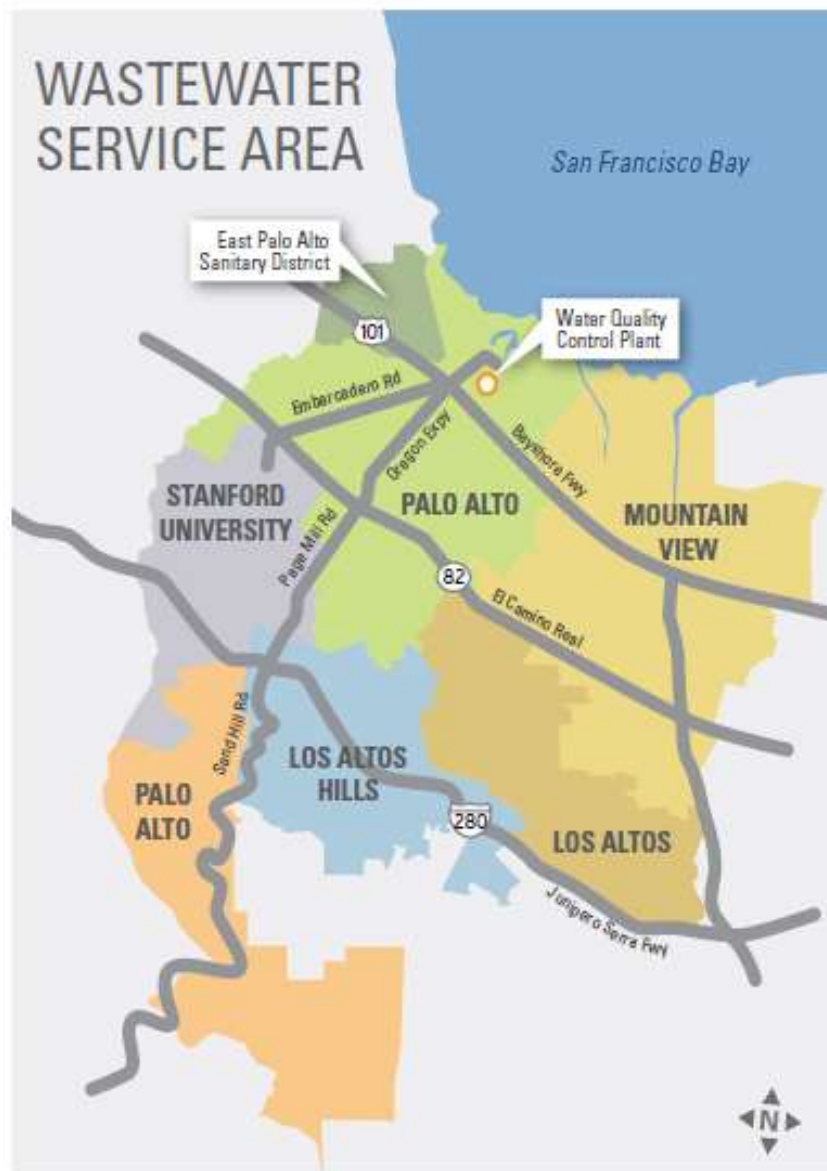
Note that one of the options being considered by Valley Water's Countywide Plan, currently under development, is export of water from the RWQCP for potable reuse further south in Santa Clara County, where Valley Water operates recharge ponds. Depending on the outcomes of the Countywide Plan, some of the Concept Options described in this Report may not be implementable due to limited supply of recycled water; further evaluation for joint implementation may be required as a next step.

Chapter 1 Introduction

1.1 Background and Purpose of the Recycled Water Strategic Plan

The Northwest County Recycled Water Strategic Plan (Strategic Plan) was undertaken by the City of Palo Alto (Palo Alto), in collaboration with Valley Water (formerly the Santa Clara Valley Water District), to assess recycled water expansion opportunities throughout the Palo Alto Regional Water Quality Control Plant (RWQCP) service area (i.e., Palo Alto, Mountain View, Los Altos, Los Altos Hills, Stanford University, and East Palo Alto Sanitary District) including additional portions of East Palo Alto and Menlo Park not serviced by the East Palo Alto Sanitary District. The cities of Palo Alto, Mountain View, Los Altos, the town of Los Altos Hills, East Palo Alto Sanitary District (EPASD), and Stanford University are known as the RWQCP Partner Agencies. Figure 1-1 shows the boundaries of the RWQCP service area as well as each of the RWQCP Partner Agencies.

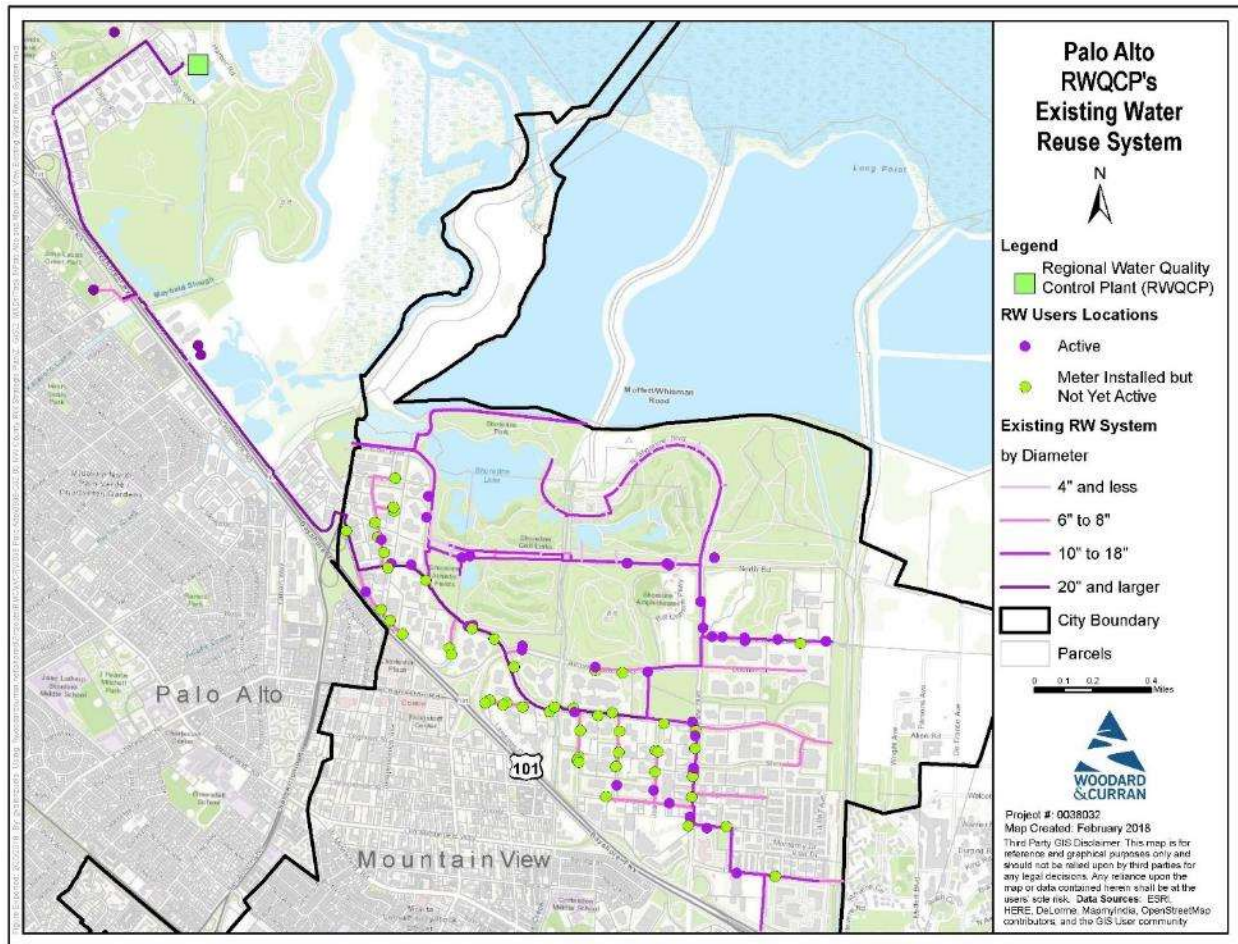
Figure 1-1: Study Area



Source: City of Palo Alto, 2017

The last comprehensive recycled water planning study for the RWQCP service area was the 1992 Recycled Water Master Plan (RWMP). Since the completion of the RWMP, Palo Alto and Mountain View implemented Phase 2 of the RWQCP’s Regional Recycled Water System, which replaced the deteriorated non-potable recycled water pipeline from Phase 1 and expanded non-potable recycled water service to the Shoreline area of Mountain View (see Figure 1-2). Both Palo Alto and Mountain View have completed individual planning studies looking at opportunities to expand recycled water in their respective service areas.

Figure 1-2: RWQCP Existing Water Reuse System



In 2008, Palo Alto completed a Recycled Water Facility Plan that recommended a Phase 3 project. The Phase 3 project would expand the non-potable recycled water system to South Palo Alto to serve landscape irrigation demands and potential dual-plumbed systems mainly within the Stanford Research Park area (see Figure 1-3). In the time that it took to certify the Program Environmental Impact Report for the Phase 3 project (2015), the recycled water setting changed. Notably, prolonged drought conditions and notable water shortages in southern California has moved forward public acceptance of potable reuse options and policy makers have begun to question the expansion of non-potable reuse (NPR) systems over long-term potable reuse options, including indirect potable reuse (IPR) and direct potable reuse (DPR). Spurred by the recent drought, the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) adopted a final version of the Groundwater Replenishment Regulations in 2014, providing a formal pathway for permitting IPR through groundwater augmentation. Regulations for permitting surface water augmentation, another type of IPR, were adopted in 2018. With the passage of Assembly Bill 574, the SWRCB is required to develop regulations for potable reuse through raw water

augmentation, a form of DPR, by 2023. While there is not yet a timeline established for development of potable reuse through treated drinking water augmentation, another form of DPR, several California agencies have begun to investigate this option. Accordingly, this Strategic Plan considers NPR, IPR, and DPR opportunities.

Figure 1-3: Proposed Phase 3 Recycled Water Project



Source: Woodard & Curran, 2018, Preliminary Design for Phase 3 Recycled Water Distribution System Final Report

In 2014, Mountain View completed a Recycled Water Feasibility Study that recommended near-term extension of recycled water into the NASA Ames Research Center and a longer-term extension south of US-101. These extensions would serve landscape irrigation demands and dual-plumbed systems. Currently (July 2019), Mountain View is in the process of updating the 2014 RWFS focusing on extending their existing system to Google and NASA, and across Highway 101.

To aid in future decisions regarding RWQCP recycled water expansion and commitments, Palo Alto, as the owner and operator of the RWQCP, saw a need to assess other RWQCP Partner Agencies' interests in recycled water. The RWQCP is interested in expanding the recycled water program to help move itself towards becoming a resource recovery facility by providing a drought-proof, sustainable, local water supply, and for recycled water's potential to help meet future regulatory actions pertaining to discharge limitations. In order to understand how to best expand the program, a comprehensive and holistic evaluation was needed to reassess the service area needs and acceptance given changes in water supplies and governing regulations.

Valley Water is also interested in understanding how flows from the RWQCP can support countywide water supply planning and its goal of using recycled and purified water to meet at least 10% (24,000 AFY) of the total county water demand by 2025. Valley Water recently completed a Pure Water Program planning study that looked at opportunities to implement potable reuse projects using water from the San Jose/Santa Clara Regional Wastewater Facility and the Sunnyvale Water Pollution Control Plant. Valley Water is now developing a Countywide Water Reuse Master Plan to understand recycled water opportunities, including NPR, IPR, and DPR, throughout Santa Clara County. The information from this Strategic Plan will support the Countywide Water Reuse Master Plan and help Valley Water identify wastewater flows that may be available for export from the RWQCP service area to other parts of the county.

The purpose of the Strategic Plan is to evaluate potential additional uses of recycled water within the RWQCP service area through the year 2030, to identify recycled water expansion concept options that look beyond individual agency boundaries, and to evaluate previously recommended recycled water projects with new expansion options developed through this Strategic Plan.

1.2 Organization of this Report

This report is organized as follows:

- **Chapter 1: Background and Purpose of the Strategic Plan** –Background on previous recycled water projects in the Study Area and a description of the wastewater and water agencies in the Study Area
- **Chapter 2: Recycled Water Demand Assessment** –Description of allowable recycled water uses and the Study Area market assessment
- **Chapter 3: Project Concept Options** –Description of the different recycled water concept options developed under this Strategic Plan
- **Chapter 4: Strategic Plan Concept Options Evaluation** –Summary of the evaluation of the concept options based on cost and non-cost criteria
- **Chapter 5: Conclusions and Next Steps** –Summary of the conclusions on the Strategic Plan concept options and next steps to be undertaken if the concept options are to move into implementation

1.3 Study Area

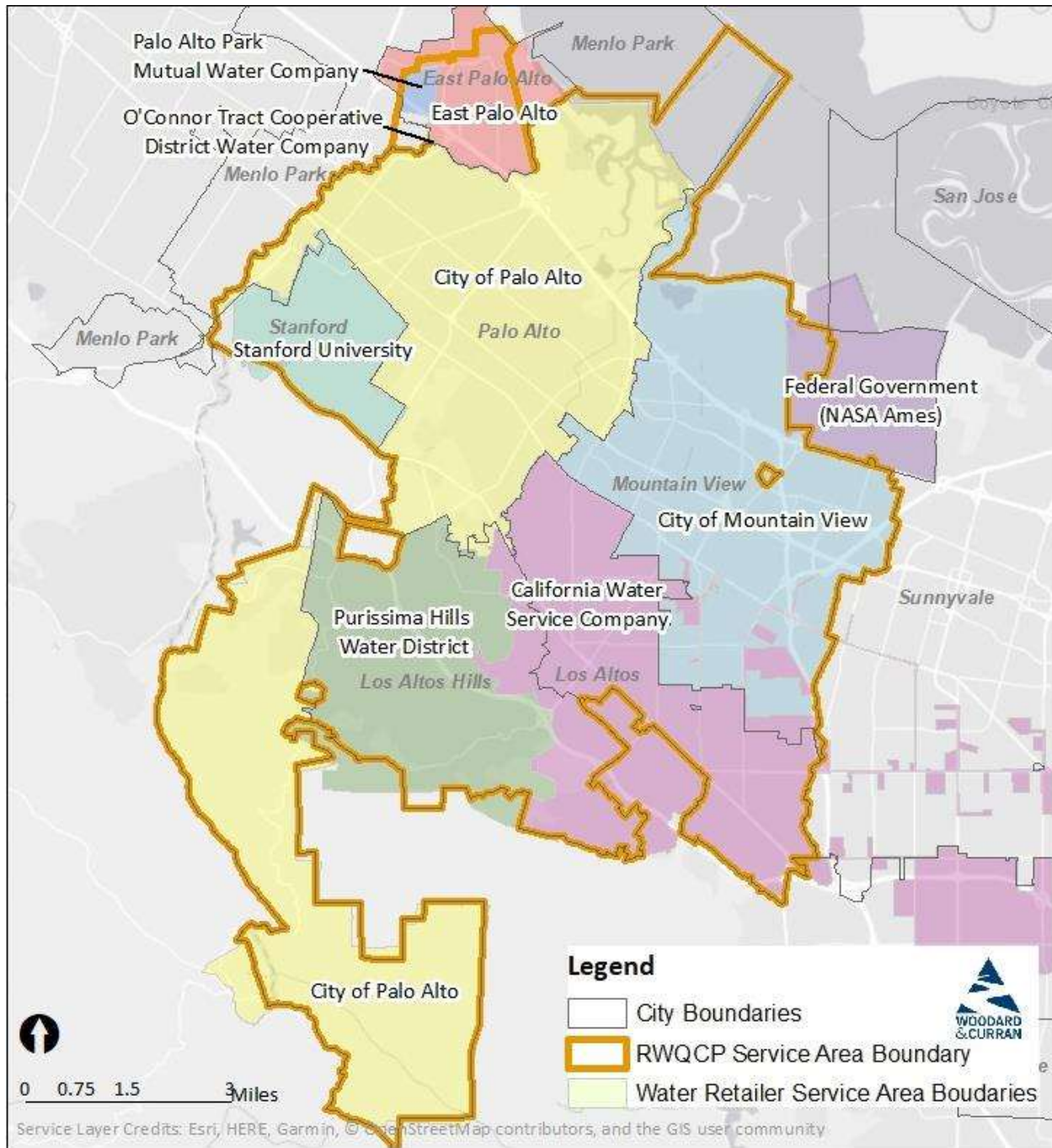
The Study Area for the Strategic Plan encompasses the RWQCP service area, shown in Figure 1-1, as well as additional areas in the Cities of East Palo Alto and Menlo Park not served by EPASD.

EPASD, which is one of the RWQCP Partner Agencies, covers the majority of East Palo Alto and a small section of Menlo Park. The portions of these cities not served by EPASD are served by West Bay Sanitary District (WBSD), which is a tributary agency to Silicon Valley Clean Water in Redwood City. Currently recycled water infrastructure does not exist in these areas, although both WBSD and Redwood City have looked at opportunities to provide recycled water to these areas. Given the proximity of the RWQCP to East Palo Alto and Menlo Park and water supply shortfalls that existed in these communities when this project was initiated, the Study Area for this project was extended beyond the RWQCP service boundary to include the entirety of East Palo Alto and the northern portion of the Menlo Park Municipal Water's service area.

1.3.1 Water Supply Agencies

The Study Area is served by two water wholesalers and a number of retailers (Figure 1-4 and Table 1-1). The wholesalers are Valley Water and San Francisco Public Utilities Commission (SFPUC), and the retailers are Palo Alto, Mountain View, California Water Service Company (Cal Water), Purissima Hills Water District (PHWD), East Palo Alto, Stanford University, Palo Alto Park Mutual Water Company, O'Connor Tract Co-operative Water Company, Federal Government (NASA Ames), and Menlo Park Municipal Water.

Figure 1-4: Water Retailers (names indicated in black text)



Valley Water distributes potable water to portions of Santa Clara County, which encompasses all but the EPASD portion of the RWQCP service area. Valley Water sells water to 13 retailers including 2 retailers in the Study Area – Mountain View and Cal Water. Valley Water is a special district that was formed to address groundwater overdraft in the county. The water delivered to retailers is a combination of local surface water, imported water from the State Water Project and Central Valley Project and water transfers. As the Groundwater Sustainability Agency for the Santa Clara and Llagas subbasins, Valley Water manages the groundwater in Santa Clara County. Valley Water diverts local surface water as well as imported water to recharge facilities to augment natural groundwater recharge.

SFPUC is the water retailer for San Francisco as well as wholesaler to 26 agencies in the San Francisco Bay Area including 6 retailers in the Study Area – Palo Alto, Mountain View, PHWD, East Palo Alto, Stanford University, and Menlo Park Municipal Water. SFPUC’s primary source of water is the Hetch Hetchy watershed of the Tuolumne River. The Tuolumne River is the largest tributary to the San Joaquin River, which feeds into the Sacramento-San Joaquin Bay-Delta.

In addition to water purchased from Valley Water and SFPUC, the majority of the Study Area retailers either utilize groundwater or have plans to develop groundwater supplies to meet demand projections. Cal Water and Stanford University currently use groundwater to meet demands. Palo Alto Park Mutual Water Company and the O’Connor Tract Co-operative Water Company rely solely on groundwater. Palo Alto and Mountain View maintain groundwater wells for emergency supply. East Palo Alto has plans to rehabilitate an existing well and develop an additional well for emergency and potential future water supply. Menlo Park Municipal Water has plans to develop groundwater as an emergency supply as well.

Stanford University is unique among the water retailers in this area in that its water supplies include local surface water and captured stormwater, which it uses to meet non-potable demands. Groundwater is used to supplement this non-potable system.

A review of retailers’ 2015 Urban Water Management Plans (UWMPs) identified the demand imbalances described herein. Although the planning horizon for the Strategic Plan is through 2030, the water supply shortfalls summarized here go through the UWMPs’ planning horizon of 2040. In normal years, East Palo Alto projected a shortfall by 2040; however, since completion of its 2015 UWMP, East Palo Alto has secured additional SFPUC supplies. During a single dry year, Menlo Park Municipal Water projected shortfalls beginning in 2020, and Mountain View, Cal Water and East Palo Alto projected shortfalls by 2040; however, since completion of its 2015 UWMP and given some major changes in land use policies, Mountain View has updated their projected shortfalls in a single dry year to occurred starting in 2020. During multiple dry years, Mountain View and Menlo Park Municipal Water project shortfall in all years beginning in 2020, and East Palo Alto projected shortfalls in all years given 2040 demands and in the second and third years under 2035 demands. Palo Alto, similar to many of the other RWQCP Partner Agencies’, is subject to water supply reductions during droughts. Shortages are expected to become more frequent and more severe in the future as a result of climate change and other changes to the California water system. Both imported water and groundwater are at risk during dry periods.

Table 1-1 summarizes the water supply sources for each city as well as the current uses, projected needs, and the local wastewater agency.

Table 1-1: Summary of Water Supply Sources and Needs

City	Wholesaler	Retailer(s)	Current/ Planned Groundwater User (Y/N)	Projected Water Supply Shortfall ¹ (Y/N)	Current Recycled Water User (Y/N)	Wastewater Agency
East Palo Alto	SFPUC / Self	<ul style="list-style-type: none"> East Palo Alto (SFPUC, groundwater) Palo Alto Park Mutual Water Company (100% groundwater) O'Connor Tract Co-operative Water Company (100% groundwater) 	Yes	Yes (2040)	No	RWQCP
Los Altos	Valley Water	Cal Water	Yes	Yes (2040)	No	RWQCP
Los Altos Hills	SFPUC	PHWD	No	No	No	RWQCP
Menlo Park	SFPUC	Menlo Park Municipal Water	Yes	Yes (2020)	No	West Bay Sanitary District
Mountain View	SFPUC & Valley Water	Mountain View	Yes	Yes (2020)	Yes	RWQCP
Palo Alto	SFPUC	Palo Alto	No	No	Yes	RWQCP
Stanford University	SFPUC	Stanford University	Yes	No	No	RWQCP

¹Projections for single dry year taken from retailer 2015 Urban Water Management Plans except Mountain View which is based on more updated information.

1.3.2 Wastewater Agencies & Current Recycled Water Programs

Palo Alto owns and operates the RWQCP, a 39.0 MGD-dry weather capacity wastewater treatment plant for the benefit of the RWQCP Partners. The RWQCP discharges treated effluent to an outfall in Lower South San Francisco Bay and to Renzel Marsh, which ultimately drains to the Lower South San Francisco Bay via Matadero Creek. The RWQCP treats an average of 20 MGD of wastewater. In addition, a portion of RWQCP effluent is further treated at tertiary recycled water facilities located at the RWQCP. The tertiary recycled water facilities have a capacity of 4.5 MGD, though currently production averages 0.6 MGD. The RWQCP has existing agreements with its Partner agencies that provide them with the right to acquire all wastewater by-products, such as recycled water, in the proportion to their percentage of influent flow. Recycled water from the RWQCP is available to Los Altos, Los Altos Hills, Stanford University and EPASD through truck-fill stations, while Palo Alto and Mountain View receive recycled water through a purple-pipe distribution system. Palo Alto and Mountain View are the only retailers in the Study Area that currently use recycled water via a purple-pipe distribution system. The RWQCP has committed a peak flow of up to 1.0 MGD to Palo Alto and 3.0 MGD to Mountain View under an agreement that extends until 2060.

Palo Alto, Valley Water, and Mountain View partnered in the development of an Advanced Water Purification Feasibility Study and Preliminary/Conceptual Design Report in 2017 to evaluate advanced treatment options for total dissolved solids (TDS) reduction in the RWQCP's recycled water for use in

irrigating salt-sensitive plants and industrial processes. The Feasibility Study recommended implementation of an Advanced Water Treatment System (AWTS) to provide 1.125 MGD of reverse osmosis treated water, with optional future expanded production reaching 2.25 MGD. The AWTS water will be blended at a 1:1 ratio with tertiary recycled water from the RWQCP to bring salinity levels between 400-500 mg/L TDS, below the Palo Alto goal of 600 mg/L TDS.

The Study Area includes a portion of WBSD's service area. WBSD provides wastewater collection services for Menlo Park, Atherton, and Portola Valley; the portion of East Palo Alto that is not served by EPASD; and areas of Woodside, unincorporated San Mateo County, and unincorporated Santa Clara County. WBSD is currently implementing a satellite recycled water facility in the southern portion of Menlo Park Municipal Water's service area and is investigating the potential to implement a satellite recycled water facility in the northern portion of Menlo Park.

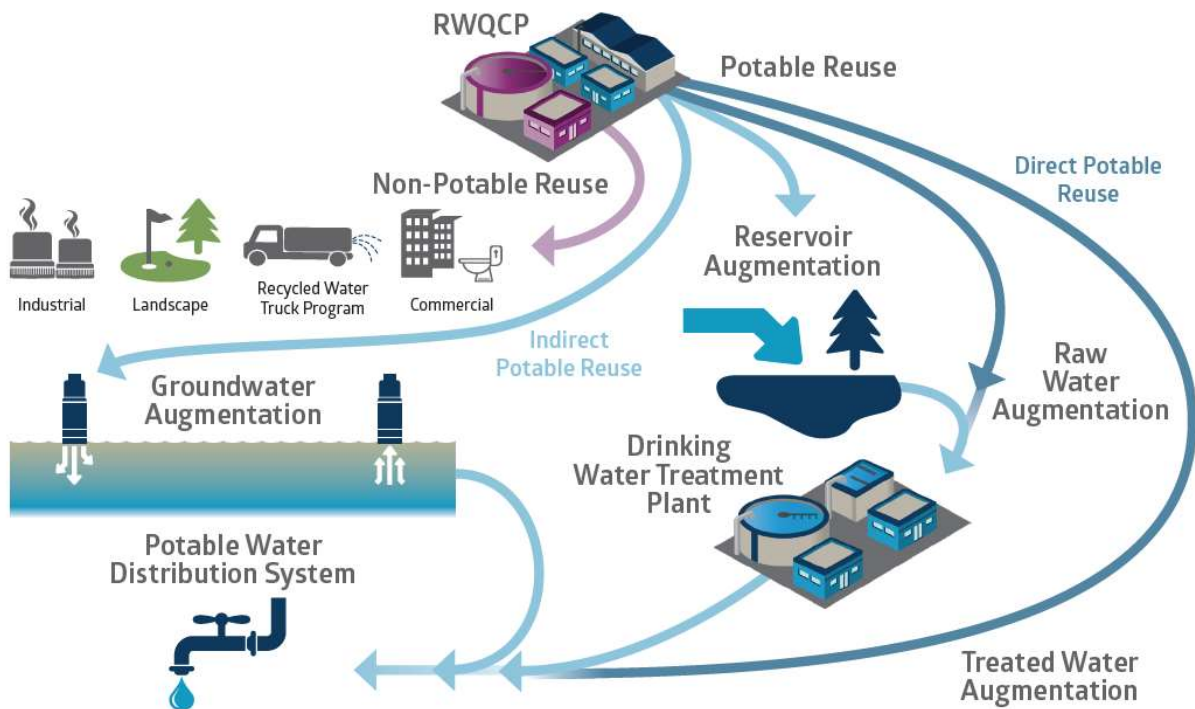
Chapter 2 Recycled Water Demand Assessment

2.1 Recycled Water Uses

2.1.1 Types of Recycled Water

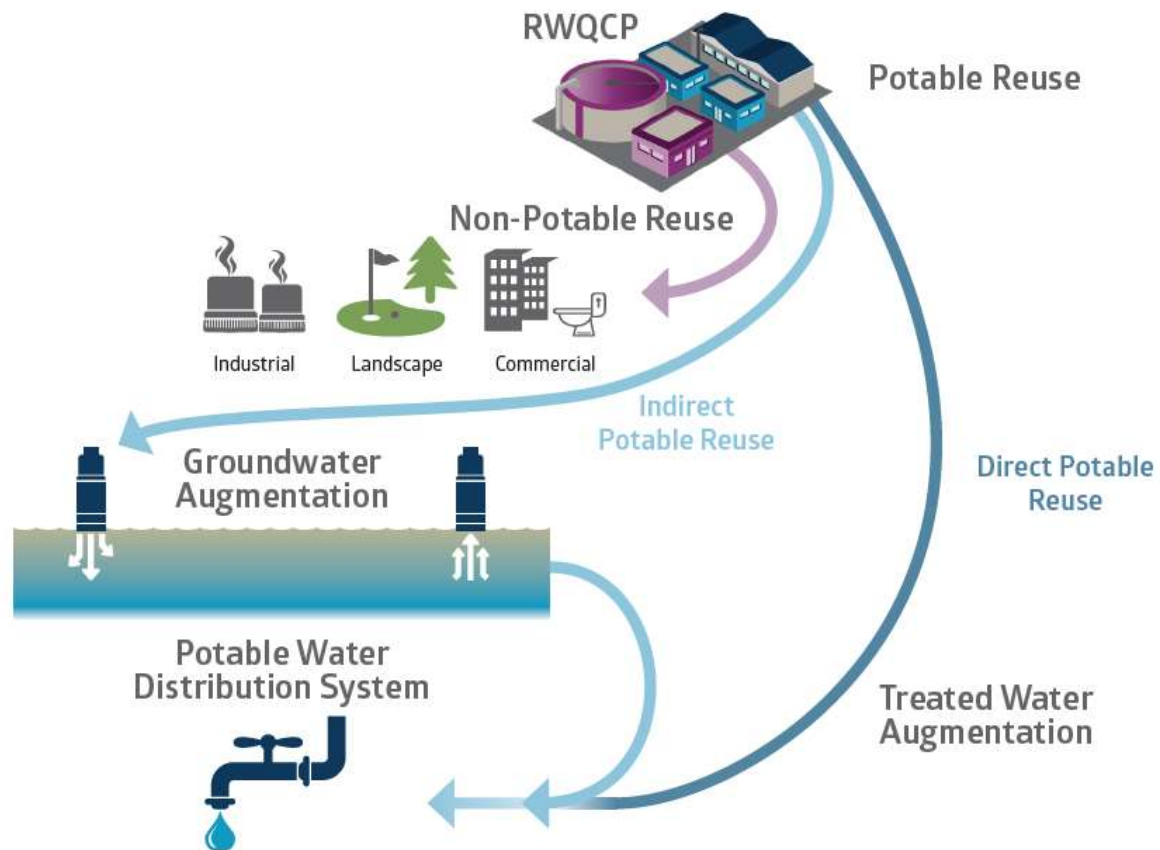
There are a variety of types of recycled water, as shown in Figure 2-1, covering both non-potable and potable reuse applications. These types of recycled water can lead to various options for how to implement conceptual projects in a specific setting. The applicability of these types of recycled water in the local setting is described in further detail later in this chapter.

Figure 2-1: Overview of Non-Potable and Potable Reuse Types



Because there is no suitable reservoir or a raw water treatment facility in the RWQCP service territory, reservoir augmentation and treated water augmentation were not evaluated. Figure 2-2 is an overview of the non-potable and potable options included in this report.

Figure 2-2: Overview of Non-Potable and Potable Reuse Types included in this Recycled Water Strategic Plan



Currently, the RWQCP produces recycled water that is treated to disinfected tertiary treatment standards and is compliant with Title 22 of the California Code of Regulations. This is defined as oxidized, filtered, and disinfected wastewater that meets a median concentration of total coliform requirements < 2.2 MPN/100mL and 5.0-log removal of viruses. This disinfected tertiary recycled water is suitable for all NPR uses considered in this study, which include landscape irrigation, dual plumbing, cooling towers, industrial process water and habitat enhancement. Further details about these non-potable uses, including associated water quality requirements requested by users and examples of potential users in the service area, are outlined in Section 2.2. The methodology used to assess NPR demands is summarized in Section 2.2.2.

IPR includes groundwater augmentation, either through percolation ponds or injection wells, where the purified recycled water mixes with the local groundwater and the mixture is extracted through existing or new wells for use in the potable (i.e., drinking) distribution system. IPR also includes reservoir augmentation, which is adding purified recycled water mixed in with local supplies in a reservoir that feeds to a surface water treatment plant, but is not considered in this Strategic Plan because no suitable reservoirs or surface water treatment plants exist proximate to the Study Area. The process to model available groundwater capacity to accept purified recycled water for recharge is included in Section 2.3.2.

DPR includes raw water augmentation, which would introduce purified recycled water upstream of a surface water treatment plant, and treated drinking water augmentation, which would introduce the purified recycled water directly to the drinking water distribution system. Raw water augmentation was not considered in this Strategic Plan because there are no surface water treatment plants within the service area of the one agency interested in DPR that also had sufficient information for this evaluation at the

time of this writing (i.e., Palo Alto). The methodology to estimate the amount of water available to direct towards DPR is included in Section 2.4.2.

2.1.2 Interests of the RWQCP Partner Agencies

The Strategic Plan team sent out surveys to the RWQCP Partner Agencies and other interested parties to gauge their interest in using recycled water to meet their current and projected demands. These stakeholders were asked about their interest in non-potable as well as potable uses, and the information received was used to inform the development of the concepts within this study. The results of the surveys are summarized in Table 2-1.

Table 2-1: Summary of Recycled Water Interests

Agency	Interested in use of Recycled Water from RWQCP	Types of Use of Interest						
		Landscape Irrigation (NPR)	Dual Plumbed Toilet Flushing (NPR)	Industrial Process Water (NPR)	Cooling Tower (NPR)	Habitat Enhancement (NPR)	Groundwater Augmentation (IPR)	Direct Potable (DPR)
City of Palo Alto	Yes	x	x	x	x	x	x	x
City of Mountain View	Yes	x	x		x			
City of Los Altos	Yes	x	x			x		
Town of Los Altos Hills	Yes	x						
East Palo Alto Sanitary District	Yes	x		x			x	x
Stanford University	No ¹		x					
Cal Water	Yes	x					x	x
City of East Palo Alto	Yes	x	x	x	x	x	x	x
City of Menlo Park	Yes	x	x	x	x			
West Bay Sanitary District	Yes	x	x	x	x		x	

Note:

1. Though Stanford University is not interested in receiving recycled water from the RWQCP, Stanford University is interested in using recycled water generated on-site for dual plumbed toilet flushing.

2.2 Non-Potable Uses

2.2.1 Potential Non-Potable Uses

Landscape Irrigation

Landscape irrigation sites identified for this study include parks, schools, commercial landscaping, multi-family residential landscaping, cemeteries, and golf courses. Irrigators in the Study Area have historically expressed concern with the salinity content in recycled water and its specific impacts to salt-sensitive species such as Redwood trees. To address these concerns and improve the quality of this water, Palo Alto, in collaboration with Valley Water and Mountain View, is planning to construct an AWTS facility

(see Section 1.3.2) to decrease RWQCP recycled water salinity and improve marketability for landscape irrigation purposes.

Dual Plumbing

Dual plumbing uses identified for this study include urinal and toilet flushing in existing dual-plumbed buildings and future developments identified in General Plans or Specific Plans where dual plumbing could be incorporated into the design of new commercial, industrial, and institutional buildings as well as multi-family residences. Existing buildings with dual-plumbing systems were included in the demand assessment; however, retrofitting existing buildings was not considered due to the cost and complexity of typical retrofits.

Because the majority of the Study Area is built out, there are few opportunities to implement dual-plumbing. East Palo Alto has the greatest potential for new development and redevelopment. This includes plans to redevelop the Ravenswood area to add various commercial and industrial buildings. In addition, various multi-residential developments were considered.

To promote dual-plumbing, Palo Alto has adopted an ordinance requiring buildings greater than 10,000 square feet within a designated Recycled Water Use Area to incorporate dual-plumbing (Palo Alto has yet to designate such an area), while Mountain View adopted the same guidelines for buildings greater than 25,000 square feet. Buildings in the planning phase that are anticipated to meet these thresholds were included as potential users. Many buildings currently under construction were approved prior to these ordinances and were not included in the demand assessment. As of this writing, no other dual plumbing or recycled water use ordinances exist within the RWQCP service area.

Cooling Tower

Cooling tower uses identified for this study include larger commercial and industrial buildings in the Study Area. Like landscape irrigation uses, cooling towers are sensitive to salinity levels in recycled water (as well as ammonia and certain metals). The AWTS (see Section 1.3.2) will make RWQCP recycled water more marketable for cooling tower purposes.

Industrial Process Water

Industrial process water use identified for this study was limited to one industrial customer in Palo Alto along the Phase 3 project pipeline alignment. The redevelopment in the East Palo Alto Ravenswood area has the potential to include industrial process water demands. However, given the uncertainty of future development plans, these potential industrial demands were not included.

Habitat Enhancement

Habitat enhancement is a potential non-potable use. While several stakeholders indicated an interest in habitat enhancement opportunities, only two specific concepts were identified:

- A horizontal levee near the RWQCP; however, because this project would be served with treated effluent without a chlorine residual and using a small dedicated pipeline, this opportunity is considered a potential habitat enhancement project beyond the scope of concept options developed for this study.
- Byxbee Park in Palo Alto was included in this study. Currently, through a pilot project, Byxbee Park receives recycled water to irrigate vegetated islands (Engelage, 2018).

Other Non-Potable Uses

Other non-potable uses in the Study Area that did not fall into the specific categories outlined above include street cleaning, car washes, and demands for Boronda Lake at Foothill Park.

2.2.2 Non-Potable Market Assessment

Site-specific water use estimates were obtained from the partner agencies, as available, including demand estimates for Palo Alto Phase 3 that were recently updated as part of the Palo Alto Phase 3 Business Plan and the Mountain View Recycled Water Feasibility Study.

Where site-specific information was not available from the agency, the methodologies described in Appendix A were used to estimate landscape irrigation, dual plumbing, and cooling tower demands. Estimates for other uses were developed as needed on a case by case basis. Peaking factors are summarized in Table 2-2.

For potential customers with the largest demand estimates, Palo Alto coordinated with the partner agencies to reach out to these potential customers to further refine the recycled water estimates.

2.2.3 Non-Potable Demand

The potential annual average recycled water demand for all non-potable users in the Study Area is 4,456 AFY or 3.98 MGD. These potential users are shown in Figure 2-3. Potential recycled water demand estimates for each non-potable customer, including a breakdown of estimated annual average, maximum day, and peak hour demands, are included in Appendix B. Appendix B includes each potential user's location, type of use (e.g. landscape irrigation, dual plumbing, industrial process water, cooling tower, etc.), site status (e.g. existing recycled water customer, existing water customer, future customer), Partner Agency, and water retailer. Appendix C contains a discussion of potential uses considered but not included in the Strategic Plan. These appendices are excluded from the public version of this report in compliance with the California Public Records Act, which protects certain utility usage data and customer information from disclosure.

The maximum day demand, defined as the average daily demand in July, for all non-potable uses in the service area is 6.84 MGD. The peaking factors used to develop the non-potable maximum day and peak hour demands are summarized in Table 2-2, and annual average and maximum day demands are summarized in Table 2-3. Peaking factors are a ratio of the maximum day or maximum hourly demand to the average day or average hourly demand.

The peak maximum day flows were used to size treatment facilities and peak hour demands were used to size pump stations and pipelines.

Table 2-2: Demand Peaking Factors

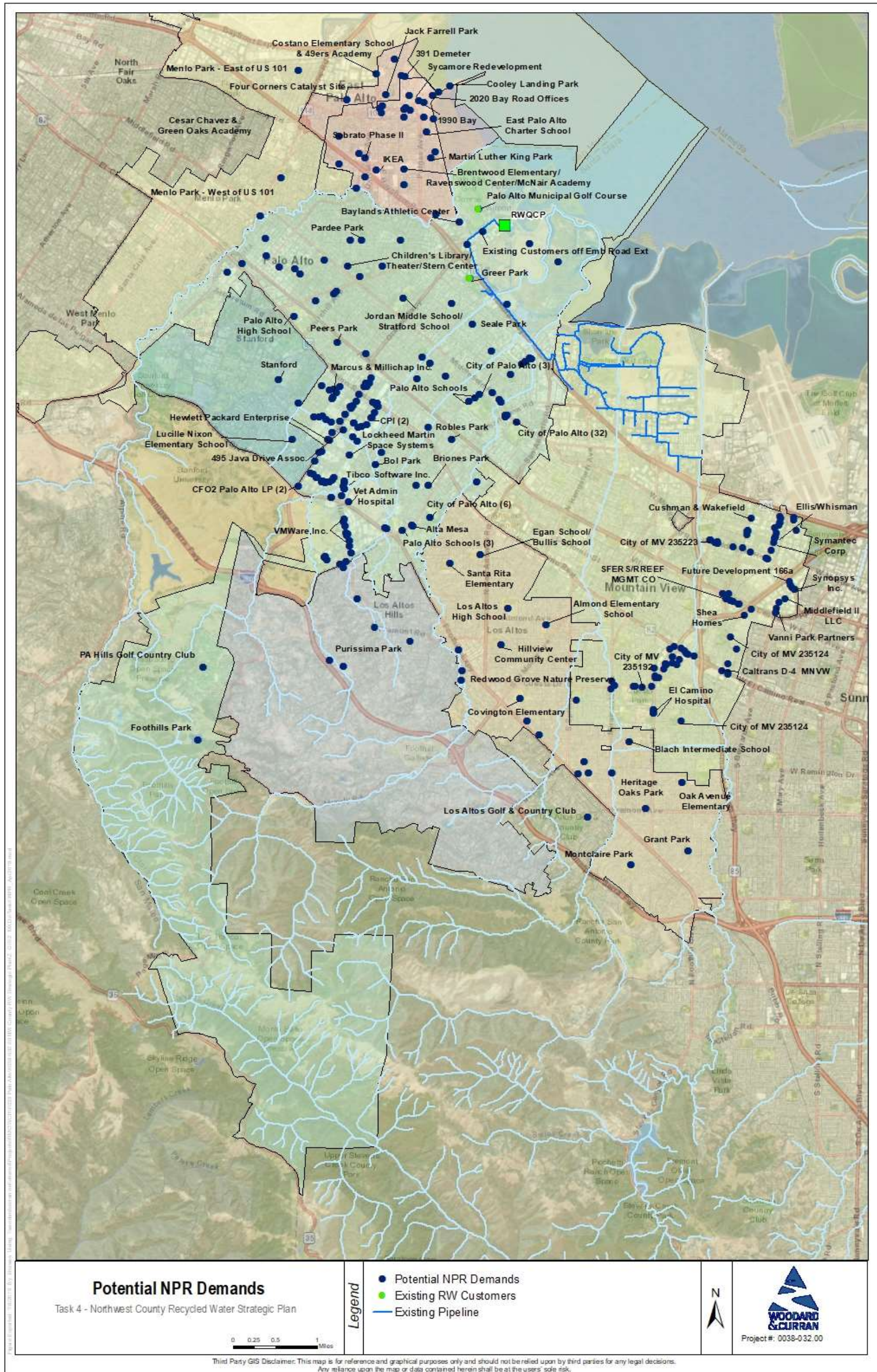
Demand Type	Peaking Factor
Maximum Day	
Irrigation	1.7
Cooling Tower	2.7
Hourly	
Irrigation ¹	3.0
Dual Plumbing	2.0
Cooling Tower	2.0

- Irrigation hourly peaking factor applies to irrigation users who use water on demand. There are a small number of irrigation customers in the Study Area with on-site water storage where this peaking factor does not apply.

Table 2-3: Non-Potable Demand Summary

Demand Type	Value
Annual Average	4,456 AFY (3.98 MGD)
Maximum Day	6.84 MGD

Figure 2-3: Potential Non-Potable Users in Study Area



2.3 Indirect Potable Uses

2.3.1 Potential Indirect Potable Uses

Indirect potable uses identified for this study focused on groundwater augmentation via injection wells. Due to the densely developed nature of the Study Area and high cost of land, groundwater augmentation via surface spreading is not viable. IPR requires full advanced treatment of recycled water. The conventional full advanced treatment train consists of membrane filtration, reverse osmosis, and an ultraviolet light -advanced oxidation process. These advanced water purification processes are designed to remove or inactivate a spectrum of constituents, including viruses, parasites, N-Nitrosodimethylamine, and 1,4-dioxane.

Within East Palo Alto, the potential to use the city's existing or future wells for IPR extraction was considered. However, after additional discussion regarding injection well siting and uncertainty of the benefit of groundwater augmentation in this area, IPR use in East Palo Alto was not considered further.

Groundwater augmentation within the Cal Water service area in Los Altos was also discussed but eliminated from the project concept options analysis. Cal Water's service area is within the area of the groundwater basins that is actively managed by Valley Water, and groundwater use in this area was deemed to be better addressed through the Valley Water's countywide efforts rather than through this Strategic Plan.

Results from a recently completed Groundwater Assessment, and Indirect Potable Reuse Feasibility Evaluation and Implementation Strategy (IPR Feasibility Evaluation) indicated that IPR within Palo Alto was technically feasible given the current condition of the aquifers in northwestern Santa Clara County and the potential to supplement Palo Alto's water supply with groundwater. Modeling results from the IPR Feasibility Evaluation and the scenario that was selected to be included in this study's project concept options are discussed in the following section.

2.3.2 Indirect Potable Reuse Assessment

The IPR Feasibility Evaluation (Todd 2018) included a characterization of hydrogeologic conditions in Palo Alto and the surrounding areas. An initial evaluation of the feasibility of increased pumping by Palo Alto was based on historical and contemporary groundwater balances in the area. Subsequently, groundwater modeling was conducted to refine the estimate of groundwater yield available to Palo Alto with and without varying levels of IPR. From the groundwater modeling assessment, one scenario was selected for use in this Strategic Plan as it represented a technically feasible recharge and extraction scenario with no projected adverse impacts, and the volume was deemed conservative and achievable while still providing a substantial volume for use. The selected scenario, referenced as Scenario 4 in the IPR Feasibility Evaluation, includes recharge of 2,800 AFY of fully advanced treated recycled water with Palo Alto extracting 5,900 AFY of augmented groundwater (i.e., mixture of groundwater and injected recycled water) to supplement potable water supplies.

2.3.3 Indirect Potable Demand

Based on Scenario 4 of the IPR Feasibility Evaluation, the annual recycled water IPR demand is 2,800 AFY. This converts to a daily demand of 2.5 MGD and is the volume of treated water that can be used for injection purposes. Once injected, the volume of water that can be sustainably extracted from the groundwater basin (or the "Project Yield") under this scenario is 5,900 AFY (or 5.27 MGD). These demands and yields are summarized in Table 2-4.

Table 2-4: IPR Demand and Groundwater Project Yield Summary

Demand Type	Value
Annual Recycled Water Demand (Daily Recycled Water Demand)	2,800 AFY (2.50 MGD)
Annual Project Yield (Daily Project Yield)	5,900 AFY (5.27 MGD)

These demand and project yield values were adjusted for IPR concept options that included NPR uses. This is further detailed in Section 3.5.3.

2.4 Direct Potable Uses

2.4.1 Potential Direct Potable Uses

At the initial stages of this study, Palo Alto, the East Palo Alto Sanitary District, East Palo Alto, and Cal Water all expressed an interest in DPR. Although DPR regulations for both raw water and treated drinking water augmentation are not yet developed, the SWRCB's DDW released a framework for these regulations in April 2018. This framework considered recycled water used for DPR purposes to be treated by full advanced treatment standards, at a minimum.

This framework also included surface water treatment as a necessary component of raw water augmentation. Because there is no dedicated surface water treatment plant in the Study Area, treated drinking water augmentation is considered the only feasible DPR option available at this time. Per anticipated DDW regulations, treated drinking water augmentation (colloquially called a "pipe-to-pipe" approach) requires water to be treated to potable standards at the advanced water treatment plant (AWTP) that would include full advanced treatment plus other treatment processes. For DPR use in Palo Alto, an AWTP would be located at the RWQCP. Meanwhile for DPR use in the East Palo Alto Sanitary District, East Palo Alto, or the Cal Water service area, the AWTP could be located at the RWQCP or a satellite site. AWTP water would then be kept in engineered storage and delivered directly to the potable water distribution system.

DPR use in Palo Alto was considered as a project concept option (D1) in this study and is further discussed in Section 3.6.

2.4.2 Direct Potable Reuse Assessment

Each partner agency to the RWQCP (including Palo Alto) retains the right to reuse as much recycled water as wastewater that was sent from their agency to the RWQCP for treatment. As such, the amount of potential DPR yield was based on Palo Alto's share of the RWQCP effluent flow, which is 7.31 MGD or about 36% of the RWQCP's average annual flow (20.3 MGD, 2010-2018 average). With 1.0 MGD assumed to be dedicated to other recycled water customers in Palo Alto, the available flow estimated to feed a DPR facility is 6.31 MGD. Finally, after accounting for a 25% rejection rate during the treatment process, the amount of produced water for potable consumption was estimated to be 4.73 MGD (average and maximum day are the same in this case such that the DPR facility operates at a constant steady rate). Similarly, this converts to an average annual demand of 5,300 AFY of 4.73 MGD. The development of this DPR demand estimate is summarized in Table 2-5.

Table 2-5: DPR Demand Estimate Summary

RWQCP Average Annual Flow (2010-2018)	Palo Alto’s Share of RWQCP Effluent Flow	Flow Available as DPR Input	Flow Produced as DPR Output
20.3 MGD	7.31 MGD	6.31 MGD	4.73 MGD (5,300 AFY)

2.5 Other Potential Uses Outside of Study Area

In addition to the Strategic Plan, Valley Water is collaborating with local stakeholders to develop a Countywide Water Reuse Master Plan (Countywide Plan). This effort aims to integrate and expand recycled and purified water as a local and drought-proof water supply throughout Santa Clara County. The plan is projected to be completed by June 2020. Valley Water’s goal is to develop recycled water to provide for at least 10% of the total county demands by 2028 by developing up to 24,000 AFY of additional potable reuse. Valley Water is exploring sourcing water from a variety of wastewater treatment facilities in Santa Clara County. One of the options being considered by the Countywide Plan is export of water from the RWQCP for potable reuse further south in Santa Clara County, where Valley Water operates recharge ponds. Depending on the outcomes of the Countywide Plan, some of the Concept Options described in this Report may not implementable due to limited supply of recycled water; further evaluation for joint implementation may be required.

Chapter 3 Strategic Plan Concept Options

3.1 Summary of Approach

Figure 3-1 summarizes the process used to develop the Strategic Plan concept options, or expansion opportunities. The approach was to start by incorporating key findings from previous studies, and to then survey and meet with the various agencies to validate previous findings and to confirm future interests. Through a Visioning Workshop, the consultant team aided the agencies in identifying and prioritizing opportunities for recycled water within the study area and to select concept options for further analysis. The consultant team then provided technical development of the concept options and preliminary evaluations which were confirmed with the agencies at an Evaluation Workshop. After completion of the evaluation of the concept options, implementation strategies for each recycled water use type were then defined.

Figure 3-1: Summary of Overall Approach to Strategic Plan Concept Option Development and Assessment



3.2 Concept Option Development Process

This section summarizes the objectives, screening process, and engineering design criteria used to develop the Strategic Plan concepts considered in the study.

3.2.1 Objectives in Concept Option Development

The following objectives guided the development of Strategic Plan Concept Options for the Study Area:

- 1) **Develop Cost Effective Concept Options:** To meet this objective, concept options were developed around large potential users as well as dense areas of users. Users with estimated demands greater than 50 AFY were included in at least one of the preliminary concept options presented to stakeholders for screening. The intent was that these customers would serve as anchor customers along an alignment, providing sufficient demand to justify needed infrastructure costs. However, because many of the large users are on the edge of the Study Area, the cost effectiveness of including some of these customers became less certain. While aiming to

meet the most demand in each concept option, the distance between customers was also considered such that concept options focused on clusters of users that could be served from a common pipeline. Extensions off the main pipeline generally were not pursued for users with less than 5 AFY of demand.

- 2) **Pursue Regional Solutions:** One of the primary goals of the Strategic Plan is to assess whether a regional approach to recycled water projects in the RWQCP service area would result in concept options that are more economically-feasible to implement and multi-beneficial. With this in mind, concept options were developed that incorporated multiple jurisdictions and water retailers to analyze whether this created beneficial outcomes in the Study Area.

3.2.2 Preliminary Concept Options Screening

In March 2018, Palo Alto and Valley Water conducted a Visioning Workshop with interested RWQCP Partner Agencies, water retailers, and neighboring agencies. At the workshop, a number of preliminary concept options were presented to the stakeholder group and valuable input received. Through discussion with the stakeholders, some of the concept options were modified, while others were eliminated. Additionally, a concept option looking at satellite treatment for non-potable reuse – versus centralized treatment at the RWQCP – was added.

The remainder of this chapter, beginning in Section 3.3, includes a description of each of the concept options evaluated. The concept options are divided into four categories:

- “A” series for NPR concept options from RWQCP (Section 3.2)
- “B” concept option for NPR from satellite treatment (Section 3.3)
- “C” series for IPR concept options (Section 3.4)
- “D” concept option for DPR (Section 3.5)

3.2.3 Engineering Design Criteria

Hydraulic Criteria

The criteria used to size the distribution infrastructure for new concept options developed as part of this study are summarized in Table 3-1. In general, the minimum pressure criterion establishes the hydraulic grade line (HGL) required, which in turn helps define pumping requirements. The maximum flow velocity criterion generally governs pipe sizing.

Table 3-1: Hydraulic Criteria

Description	Value
Pipelines	
Minimum Pressure at Standard Pressurized Customer Connections	40 psi
Minimum Pressure at Injection Well Connections ¹	15 psi
Minimum Pressure at Pond Storage Customer Connections	10 psi
Maximum Customer Pressure ²	120 psi
Minimum Pipe Size	6 in
Maximum Flow Velocity	5 ft/s
Pump Stations	
Assumed Pumping Efficiency	75%
Non-Overloading Horsepower Adjustment	10%
Maximum Standard Motor Size, Each Pump	100 hp

Notes:

1. Determined to be the minimum required pressure for injection wells, per communication with Sally McCraven, Todd Groundwater.
2. Certain customer demand nodes exceed the maximum pressure criterion at times, which is acceptable to maintain minimum service pressures elsewhere. Customers with high pressures will require a pressure regulating valve on the service line.

A spreadsheet was developed to model each concept option's pipe network and optimized backbone pipe sizes. Each alignment was divided into segments, and peak hour flows for each customer along or downstream of a given segment were aggregated to determine the minimum pipeline diameter needed to convey maximum flows. This model was utilized to check pressure at customer connections and determine each concept option's pump station sizes.

To develop conceptual costs at this planning level, hydraulic head required at the RWQCP to serve the concept options was treated as a separate pump station at the RWQCP location. The potential for integrating this hydraulic capacity to existing facilities at the RWQCP would need to be analyzed upon further development of any concept option. The results for each concept option's hydraulic analysis, including pipeline and pump station sizing, are summarized in Sections 3.3 to 3.6.

Treatment Criteria

Palo Alto has committed to delivering 3.0 MGD of enhanced recycled water to Mountain View and 1.0 MGD to Palo Alto for non-potable uses. As discussed in Section 1.3.2, Palo Alto is planning to implement an AWTS to provide 1.125 MGD of reverse osmosis treated water, which will be blended at with RWQCP tertiary recycled water to produce enhanced recycled water with a target TDS level below 600 mg/L. Plans for the AWTS include potential expansion to produce 2.25 MGD of reverse osmosis treated water.

In evaluating additional treatment needs for the centralized NPR concept options ("A" series) in this study, it is assumed that the 2.25 MGD AWTS facility will be constructed. If a combination of the AWTS facility and the existing 4.5 MGD granular media filters can be used to meet the total demand for a concept option including the current flow commitments for NPR in Mountain View and Palo Alto while still meeting a 600 mg/L TDS target, additional treatment is not included. As such, the 1:1 blend ratio used in the 2017 Advanced Water Purification Feasibility Study and Preliminary/Conceptual Design Report is not used for this study. Rather, 2.25 MGD AWTS produced water with TDS of 50 mg/L is assumed to be combined with the balance of RWQCP tertiary recycled water needed to meet the concept option demand with TDS of 900 mg/L. Consequently, the final TDS concentration varied depending on the concept option tertiary recycled water demand, however all concept options remained below the 600 mg/L TDS goal. This approach allows the NPR concept options to be consistent with the previously

completed Feasibility Study while maintaining sufficient operational flexibility to ensure cost effective solutions to meet enhanced recycled water demands.

For non-potable uses served from a satellite treatment facility, this study assumes the facility to provide disinfected tertiary treated recycled water and that saline inflow and infiltration is negligible.

For IPR, recycled water would be treated to full advanced treatment standards for injection (membrane filtration, reverse osmosis, and an ultraviolet light -advanced oxidation process). In addition, each extraction well is planned to have wellhead treatment per Option 4 of Palo Alto's 2017 Water Integrated Resources Plan. Option 4 includes treatment for iron, manganese, and TDS at each well site such that the extracted water will be comparable to SFPUC water supplies. Option 4 is the treatment option assumed for this study since this is most comparable to the existing Palo Alto supply and most likely to gain customer acceptance.

For DPR, treatment standards were designed to align with guidance provided by the SWRCB in its Proposed Framework for Regulating Direct Potable Reuse in California (April 2018). Also, the SWRCB's Feasibility Report on Developing Uniform Water Recycling Criteria for DPR indicated that DPR treatment trains should be sourced from tertiary recycled water (defined as any process employed after secondary treatment to further improve water quality). Therefore, the water quality of the influent wastewater for DPR was assumed to be final effluent from the RWQCP; the RWQCP is a tertiary treatment facility that treats all of its wastewater beyond secondary treatment standards. In addition to the steps required to treat recycled water to full advanced treatment standards, the DPR train would include ozone, biologically active filtration, and free chlorine process steps.

Reverse osmosis concentrate treatment is included in concept options as necessary to maintain compliance with the RWQCP's NPDES discharge permit. The 2017 Advanced Water Purification Feasibility Study identified maximum AWTS sizes to comply with the RWQCP's permit without concentrate treatment under the following scenarios:

- Scenario 1. All enhanced recycled water: This scenario assumes all of the advanced treated water from the AWTS is blended with tertiary-treated recycled water at a 1:1 ratio and distributed to customers.
- Scenario 2. All potable reuse: This scenario assumes all of the advanced treated water from the AWTS would be used for potable reuse and no blending with tertiary-treated recycled water would occur.
- Scenario 3. Enhanced recycled water with additional potable reuse: This scenario assumes implementation of a 2.25 MGD AWTS for enhanced recycled water production (4.5 MGD of total enhanced recycled water capacity) with the remaining advanced water purification facility (AWPF) capacity for potable reuse.

Table 3-2 summarizes the findings from the feasibility study which were based on a conservative approach in order to meet the various maximum daily permit limits. The scenarios relevant to this planning effort are Scenarios 1 and 3. The Strategic Plan assumes that the 2.25 MGD enhanced recycled water AWTS will be constructed to meet the RWQCP's existing commitments to Mountain View and Palo Alto. If any of the NPR concept options were to require additional AWTS treatment capacity, the threshold above which concentrate treatment would be needed is an additional 1.65 MGD of AWTS capacity (for total enhanced recycled water capacity of 7.8 MGD). For the IPR and DPR concept options (which both including reverse osmosis in their treatment trains), the threshold above which concentrate treatment would be needed is 2.5 MGD.

Table 3-2: Maximum AWTS Sizes Without Requiring Reverse Osmosis Concentrate Treatment

	Maximum AWTS Size (MGD)	AWTS for Enhanced Recycled Water Size (MGD)	Enhanced Recycled Water Produced (MGD)	AWPF for Potable Reuse Size (MGD)
Scenario 1: All Enhanced Recycled Water	3.9	--	7.8	--
Scenario 2: All Potable Reuse	5.8	--	--	5.8
Scenario 3: Enhanced Recycled Water AWTS of 2.25 MGD with Additional Potable Reuse	4.8	2.25	4.5	2.5

Note: The sizing is based on the RWQCP's minimum daily flow of 12 MGD. See MNS Advanced Water Purification System Preliminary/Conceptual Design Report, December 2017, for additional details.

3.3 Concept Options A: NPR from RWQCP

There are six concept options in the "A" series that contain different pipeline alignments to meet differing NPR demands throughout the Study Area:

- A1: The Phase 3 Pipeline to south Palo Alto recommended in the 2008 City of Palo Alto Recycled Water Facility Plan and reassessed through the 2018 Phase 3 Business Plan and 2018 Preliminary Design Report. This concept option was included in this study in order to evaluate its feasibility relative to other concept options.
- A2: Extends the Phase 3 Pipeline (Concept Option A1) to serve additional customers in the Palo Alto Foothills and Los Altos Hills.
- A3: Extends Concept Option A2 to serve additional customers in Los Altos.
- A4: Extends the Mountain View Systems in accordance with the Long-Term Expansion Project from the 2014 Mountain View Recycled Water Feasibility Study. This concept option was included in this study in order to evaluate its feasibility relative to other concept options.
- A5: Extends Concept Option A4 to service customers in Los Altos.
- A6: Serves existing and future customers in East Palo Alto and Palo Alto and includes sizing facilities for an extension to Menlo Park.

3.3.1 Concept Option A1: NPR Palo Alto Phase 3

Concept Option A1 is the Phase 3 Pipeline to south Palo Alto recommended in the 2008 Palo Alto Recycled Water Facility Plan and reassessed through the 2018 Phase 3 Business Plan and 2018 Preliminary Design Report. Facilities for the concept option are summarized in Table 3-3 and shown on Figure 3-2.

Notable items from Concept Option A1 are:

- Customers: Unlike other customers on Phase 3, the anchor customer for this Concept Option relies on groundwater for its water supply and does not currently receive water service from Palo Alto.
- Pipelines: Build off the existing 30-inch recycled water backbone along Embarcadero Road.
- Pump Stations: Two - 1) expansion of existing recycled water pump station at the RWQCP; and 2) a booster pump station along the Phase 3 alignment.

Table 3-3: Demand and Facility Summary for Concept Option A1, NPR Palo Alto Phase 3

Customer Location	Number of Users	Demand Total (AFY)
Palo Alto – Phase 3	109	634
Anchor Customer ¹	1	167
Total	110	801

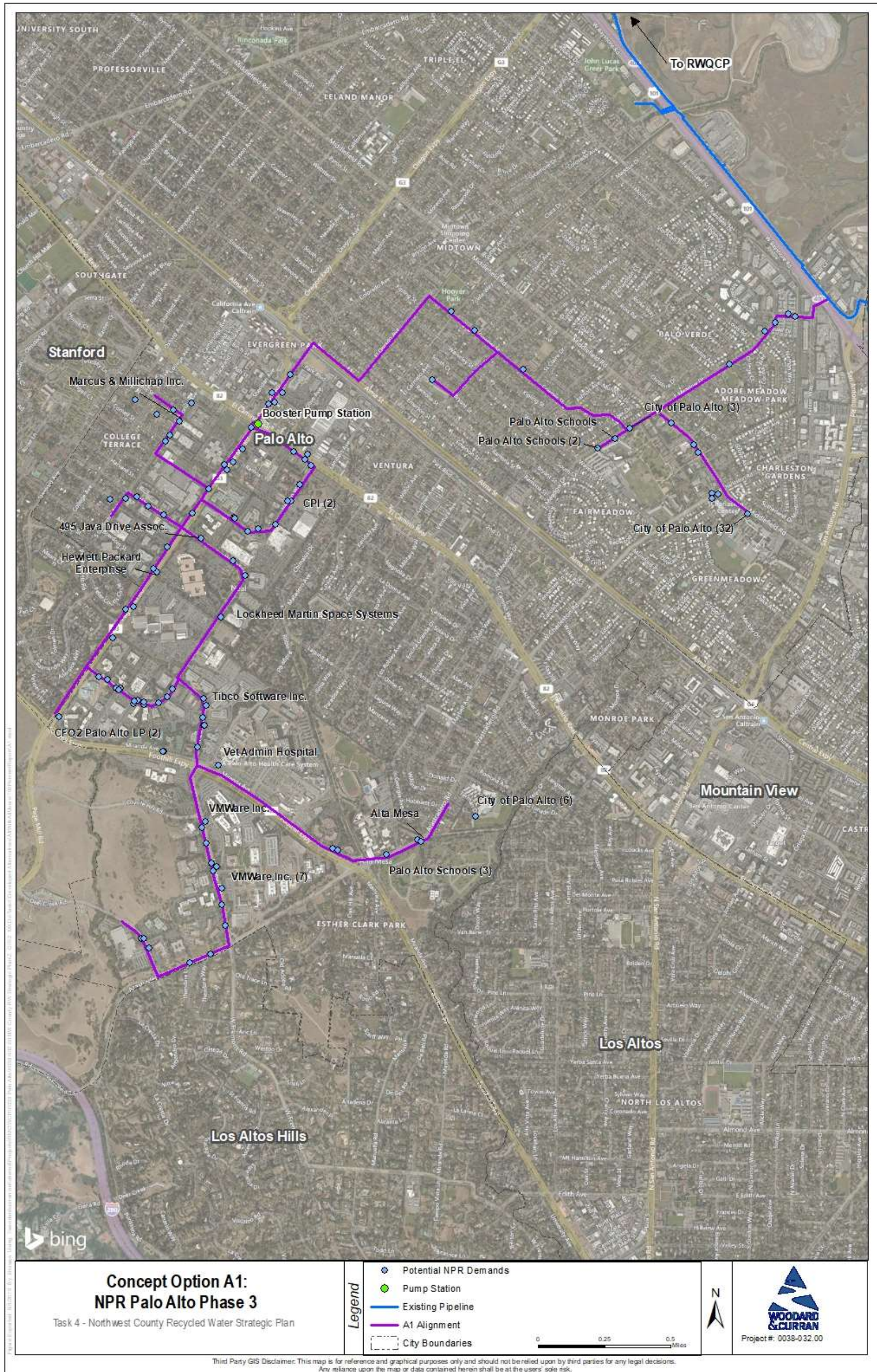
Modeled Pipe ID (in)	Approximate Length of Pipe (LF)
6	18,500
8	9,000
10	7,200
12	23,200
Total Length (LF)	57,900
Total Length (mi)	11.0

Description	Performance Requirements	
	Recycled Water Pump Station	Phase 3 Booster Pump Station
Required Flow	1,637 gpm	1,408 gpm
Discharge Head	200 ft	198 ft
Pump Configuration (duty + standby)	2 (duty)	3+1
Pump Motor Rating (each)	100 hp	60 hp
Total Installed Motor Horsepower	200 hp	240 hp

Notes:

1. Anchor customer is distinguished from the rest of the Phase 3 customers because, unlike others, this customer relies on groundwater for its water supply and does not currently receive water service from Palo Alto.

Figure 3-2: Alignment for Concept Option A1, NPR Palo Alto Phase 3



3.3.2 Concept Option A2: NPR Palo Alto Phase 3 Extended to Foothills

Concept Option A2 extends the Phase 3 Pipeline in Concept Option A1 to serve additional customers in the Palo Alto Foothills and Los Altos Hills. The Concept Option A2 alignment is shown in Figure 3-3. A summary of the customers included in this concept option and their corresponding demand values and facilities are outlined in Table 3-4.

Some notable items for Concept Option A2 are:

- Customers: Concept Option A2 captures two additional high demand customers and benefits an additional RWQCP partner by including a branch to Los Altos Hills.
- Pipelines: Build off of the existing 30-inch recycled water backbone in Embarcadero Road.
- Pump Stations: Four - Expansion of the existing recycled water pump station at the RWQCP and three booster pump stations at optimized locations throughout the alignment.

Table 3-4: Demand and Facilities Summary for Concept Option A2, NPR Palo Alto Phase 3 Extended to Foothills

Customer Location	Number of Users	Demand Total (AFY)		
Palo Alto – Phase 3	109	634		
Anchor Customer No. 1 ¹	1	167		
Anchor Customer No. 2	1	169		
Foothills Park	1	75		
Los Altos Hills	3	24		
Total	115	1069		

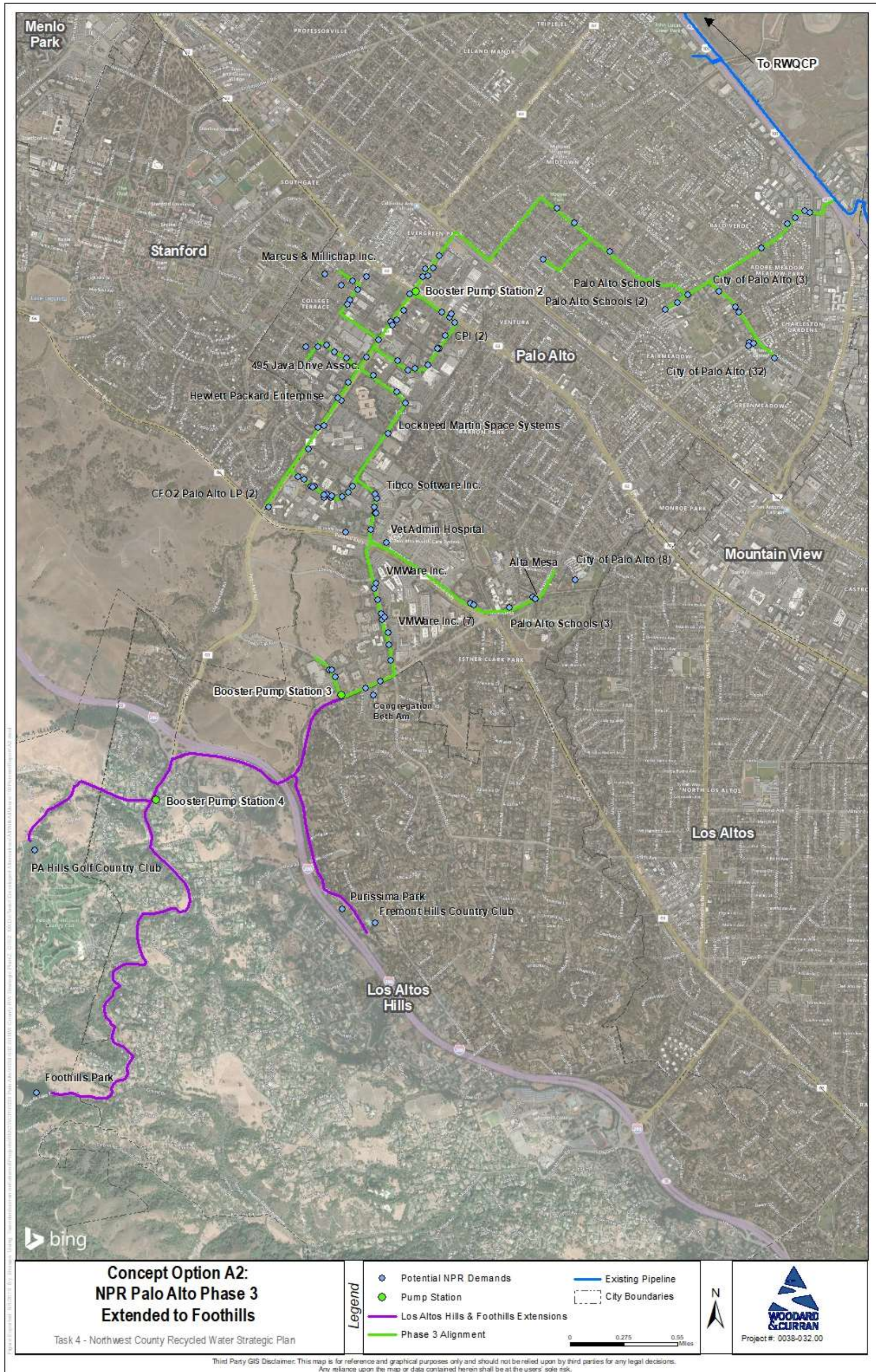
Modeled Pipe ID (in)	Approximate Length of Pipe (LF)
6	55,100
8	8,600
10	5,900
12	1,000
16	8,000
Total Length (LF)	78,600
Total Length (mi)	14.9

Description	Performance Requirements			
	Recycled Water Pump Station (PS1)	Booster Pump Station #2 (PS2)	Booster Pump Station #3 (PS3)	Booster Pump Stations #4 (PS4)
Required Flow	2,270 gpm	1,887 gpm	268 gpm	161 gpm
Discharge Head	178 ft	285 ft	174 ft	588 ft ³
Pump Configuration (duty + standby)	3+1	3+1	1+1	2+1
Pump Motor Rating (each)	50 hp	75 hp	20 hp ²	20 hp
Total Installed Motor Horsepower	200 hp	300 hp	40 hp	60 hp

Notes:

1. Required discharge head at Booster Pump Station #4 is notably larger due to the 610-foot elevation increase from its location to the end user (Foothills Park).
2. After assessing the feasibility of other hydraulic configurations (including removing Booster Pump Station #3 and upsizing other booster pump stations), it was determined that including Booster Pump Station #3 at the specified pump motor rating was optimal to meet pressure criteria at nearby customers.
3. Anchor Customer No. 1 is distinguished from the rest of the Phase 3 customers because, unlike other customers on Phase 3, this customer relies on groundwater for its water supply and does not currently receive water service from Palo Alto.

Figure 3-3: Alignment for Concept Option A2, NPR Palo Alto Phase 3 Extended to Foothills



3.3.3 Concept Option A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos

Concept Option A3 extends the Phase 3 Pipeline to serve additional customers in the Palo Alto Foothills, Los Altos, and Los Altos Hills to capture some of the highest potential demands as well as create a more regional NPR concept option.

The original intent of this concept option was to capture customers within the northern portion of Los Altos by branching off of the proposed Phase 3 pipeline on Arastradero Road, crossing Adobe Creek and ending at Hillview Community Center. However, during development of the proposed alignment, it was determined that crossing to Los Altos from the Alta Mesa Memorial Park region required too much disruption and coordination with private entities. As such, the alignment to Los Altos extends eastward to Briones Park, down El Camino Real, and southwards towards Covington Elementary School, resulting in a longer length of pipeline than initially envisioned.

The Concept Option A3 alignment and customer demands are shown in Figure 3-4. A summary of the customers included in this concept option and their corresponding facilities are outlined in Table 3-5.

- Customers: Serves customers in Palo Alto, Los Altos, and Los Altos Hills including Briones Park and Elementary School in Palo Alto.
- Pipelines: Concept Option A3 would be built off of the 24-inch recycled water pipeline on East Bayshore. In order to meet the additional demands in the Palo Alto Foothills, Los Altos, and Los Altos Hills, some of the Phase 3 pipeline segments were upsized for additional capacity.
- Pump Stations: Five – expansion of the existing recycled water pump station at the RWQCP and four booster pump stations at optimized locations throughout the alignment.

Table 3-5: Demand and Facilities Summary for Concept Option A3, NPR Palo Alto Phase 3 Extended to Foothills and Los Altos

Customer Location	Number of Users	Demand Total (AFY)	
Palo Alto – Phase 3	109	634	
Anchor Customer No. 1 ¹	1	167	
Briones Park	1	14	
Briones Elementary School	1	5	
Anchor Customer No. 2	1	169	
Foothills Park	1	75	
Los Altos	8	143	
Los Altos Hills	3	24	
Total	125	1231	

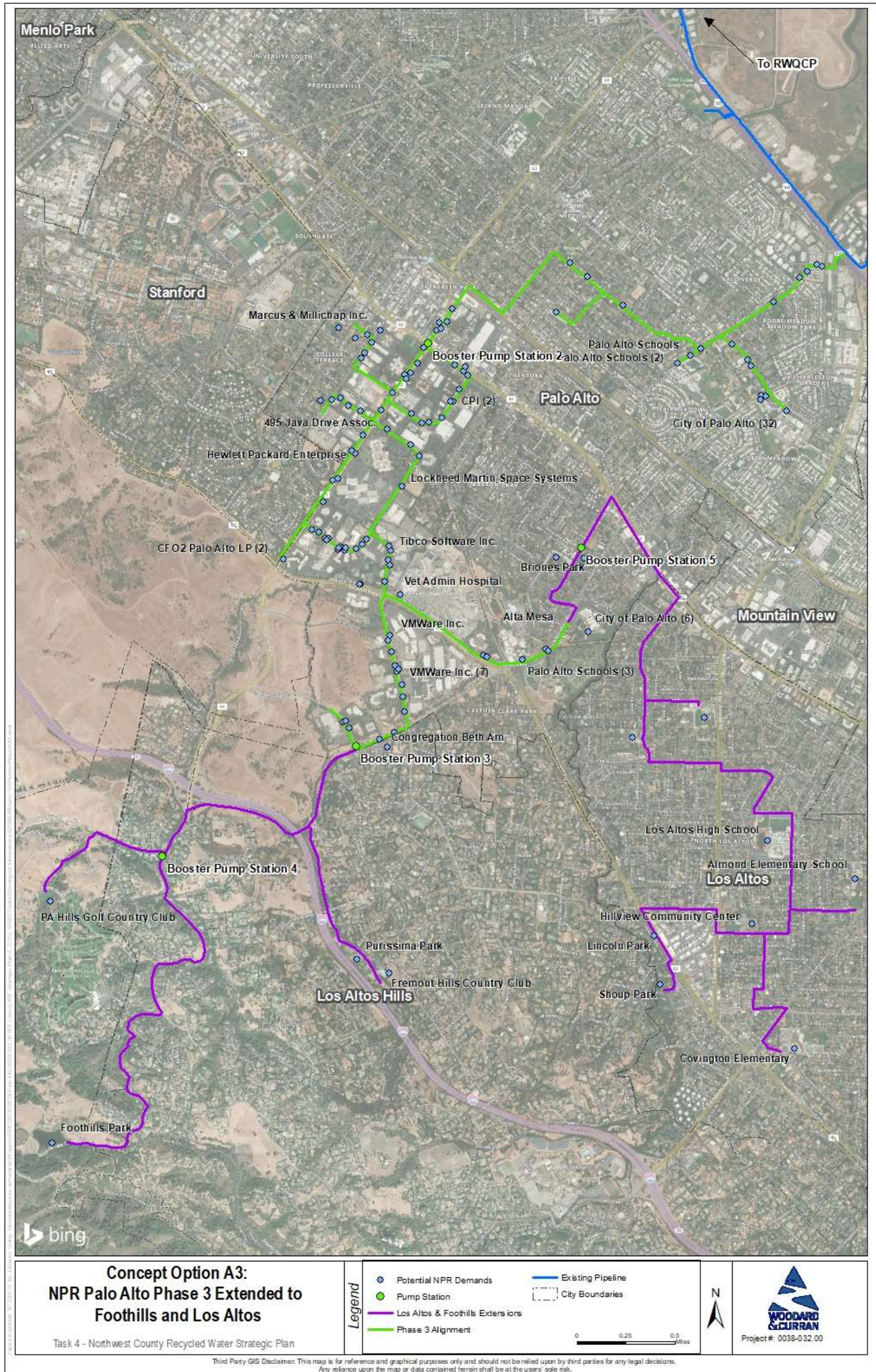
Modeled Pipe ID (in)	Approximate Length of Pipe (LF)
6	65,000
8	32,700
12	3,600
16	9,000
Total Length (LF)	116,200
Total Length (mi)	22.0

Description	Performance Requirements				
	Recycled Water Pump Station (PS1)	Booster Pump Station #2 (PS2)	Booster Pump Station #3 (PS3)	Booster Pump Station #4 (PS4)	Booster Pump Station #5 (PS5)
Required Flow	2,783 gpm	2,399 gpm	268 gpm	161 gpm	454 gpm
Discharge Head	204 ft	271 ft	174 ft	588 ft	133 ft ²
Pump Configuration (duty + standby)	3+1	4+1	1+1	2+1	2+1
Pump Motor Rating (each)	75 hp	60 hp	20 hp	20 hp ³	23d hp
Total Installed Motor Horsepower	300 hp	300 hp	40 hp	60 hp	69 hp

Notes:

1. Anchor Customer No.1 is distinguished from the rest of the Phase 3 customers because this customer relies on groundwater for its water supply and does not currently receive water service from Palo Alto.
2. Required discharge head at Booster Pump Station #4 is notably larger due to the 610-foot elevation increase from its location to the end user (Foothills Park).
3. After assessing the feasibility of other hydraulic configurations (including removing Booster Pump Station #3 and upsizing other booster pump stations), it was determined that including Booster Pump Station #3 at the specified pump motor rating was optimal in order to avoid exceeding pressure criteria for customers near Booster Pump Station #5.

Figure 3-4: Alignment for Concept Option A3, NPR Palo Alto Phase 3 Extended to Foothills and Los Altos



3.3.4 Concept Option A4: NPR Mountain View

Concept Option A4 is the Mountain View Long-Term Expansion Project from the 2014 Mountain View Recycled Water Feasibility Study (RWFS). This concept option was included in this study to evaluate its feasibility relative to other concept options. Note that the distribution system hydraulic analysis criteria used in the Mountain View RWFS differ slightly from those presented in Table 3-1 but resulting facility sizing would be similar. Also of note, Mountain View is in the process of updating the 2014 RWFS focusing on extending their existing system to Google and NASA, and across Highway 101.

The Concept Option A4 alignment and customer demands are shown in Figure 3-5. A summary of the customers included in this concept option and their corresponding facilities are outlined in Table 3-6.

Notable items from Concept Option A4 are:

- Customers: Same as the customers identified in the Mountain View RWFS for the Long-Term Expansion Project continuing to build off of Mountain View's Phase 2 pipeline.
- Pump Station: Additional pumping capacity at the Charleston Pump Station and NASA Pump Station to meet peak hour demands for Concept Option A4.

Pump Stations

The Recommended Project presented in Mountain View RWFS Study consists of three phases: the Short-Term Expansion, the Mid-Term Expansion, and the Long-Term Expansion. The Short-Term and Mid-Term Expansions are constructed or planned to be constructed by 2020, while the construction of the Long-Term Expansion is unscheduled. The total system for all phases of the Mountain View Recommended Project requires two pump stations: one at Charleston Park and one at NASA's Ames Research Park (NASA Pump Station). The Charleston Park Pump Station was initially sized at 450 hp to meet demands included in the Short-Term and Mid-Term Expansions. To meet the peak hour demand for the Long-Term Expansion, two additional variable frequency drive units with a combined capacity of 100 hp would need to be added to the Charleston Park Pump Station for a total installed horsepower of 550. Additional capacity would need to be installed at the 275-hp NASA Pump Station to meet Long-Term Expansion demands. This includes an additional 25-hp variable frequency drive unit for a total capacity of 300 hp.

Storage Tank Sizing

As part of the Mid-Term Phase, a storage tank with 1.6 MG capacity was included to meet demands included in all phases of the Recommended Project. This storage facility is sited at NASA's Ames Research Park and is planned to be constructed. Therefore, the cost of the storage tank is included in the Mid-Term Phase construction and is not considered in the Concept Option A4 cost estimate. Pending the results of the current update to the 2014 RWFS, previous recommendations for sizing of storage and pump stations may be altered.

Table 3-6: Demand and Facilities Summary for Concept Option A4, Mountain View

Customer Location	Number of Users	Demand Total (AFY)
Mountain View – Long-Term Expansion	42	216
Total	42	216

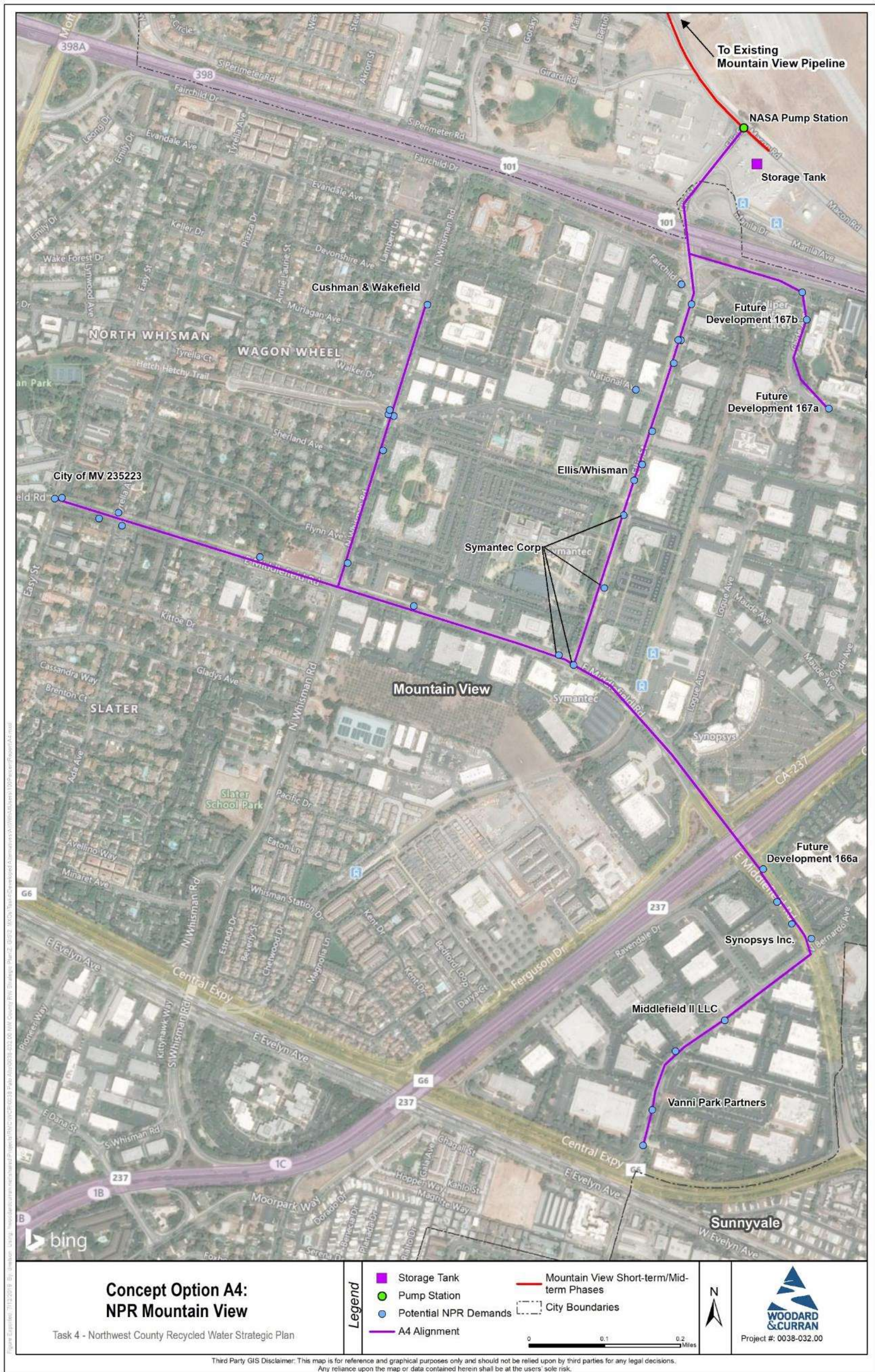
Modeled Pipe ID (in)	Approximate Length of Pipe (LF)
6	12,200
10	1,500
12	2,500
Total Length (LF)	16,200
Total Length (mi)	3.1

Description	Additional Capacity Requirements	
	Charleston Park Pump Station	NASA Pump Station
Required Flow	900 gpm ¹	600 gpm ²
Pump Configuration (duty only) ³	2 ⁴	1 ⁴
Pump Motor Rating (each)	50 hp ⁴	25 hp ⁴
Total Installed Motor Horsepower	100 hp (for 550 hp total system capacity) ⁴	25 hp (for 300 hp total system capacity) ⁴

Notes:

1. Calculated as the difference between the total design flow (6,100 gpm; Mountain View RWFS, p. 7-11) and the design flow for the Mid-Term Expansion (5,200 gpm; Mountain View RWFS, p. 7-9).
2. Calculated as the difference between the total design flow (4,300 gpm) and the design flow for the Mid-Term Expansion (3,700 gpm). Both values were found in the Mountain View RWFS, Table 7.4.
3. The Mountain View RWFS installed pump horsepower does not include spare pumping capacity, per the note in Table 7.4.
4. The pumps' configuration, motor rating, and total installed horsepower are on page 7-11 of the Mountain View RWFS.

Figure 3-5: Alignment for Concept Option A4, NPR Mountain View



3.3.5 Concept Option A5: NPR Mountain View Extended to Los Altos

Concept Option A5 would serve customers from Concept Option A4 and includes an extension that was considered in the 2014 Mountain View RWFS “Alternative 3”. While initially considered as a long-term extension for the Mountain View system, “Alternative 3” was not included as part of Mountain View’s final Recommended Project to due financial considerations. For the purposes of this study, Concept Option A5 uses that same alignment and customer base, then extends service to Los Altos customers south of Central Expressway to El Camino Hospital and Cooper Park, including the Los Altos Golf & Country Club. The Concept Option A5 alignment and customer demands are shown in Figure 3-6. A summary of the customers included in this concept option and their corresponding facilities are outlined in Table 3-7.

Notable items from Concept Option A5 are:

- Customers: Concept Option A4 with expansion to service additional Mountain View and Los Altos customers.
- Pump Stations: Two - 1) located at the NASA’s Ames Research Park that serves all users on the Long-Term Expansion alignment and 2) another located at Central Expressway that serves all other users.
- Storage Tank: Operational volume of 1.2 MG to serve Concept Option A5 users beyond the Long-Term Expansion demands, located at NASA Ames Research Park.

Storage Tank Sizing

To provide enough supply during peak hours, Concept Option A5 requires a storage tank. The Mountain View RWFS included a “NASA Storage Tank” at the connection between the Mid-Term and Long-Term Expansion alignments, located at NASA’s Ames Research Park. This tank is sized to meet demands through the Long-Term Expansion. Additional storage capacity is required to meet Mountain View and Los Altos demands beyond the Long-Term Expansion users. For planning purposes, this increased capacity requirement was sized and cost as a separate storage tank at the NASA Storage Tank location. The potential for adding this capacity to existing storage facilities at NASA’s Ames Research Park location would need to be evaluated upon further development of this concept option. The storage tank operational volume needed to serve Concept Option A5 users beyond the Long-Term Expansion demands is 1.2 MG.

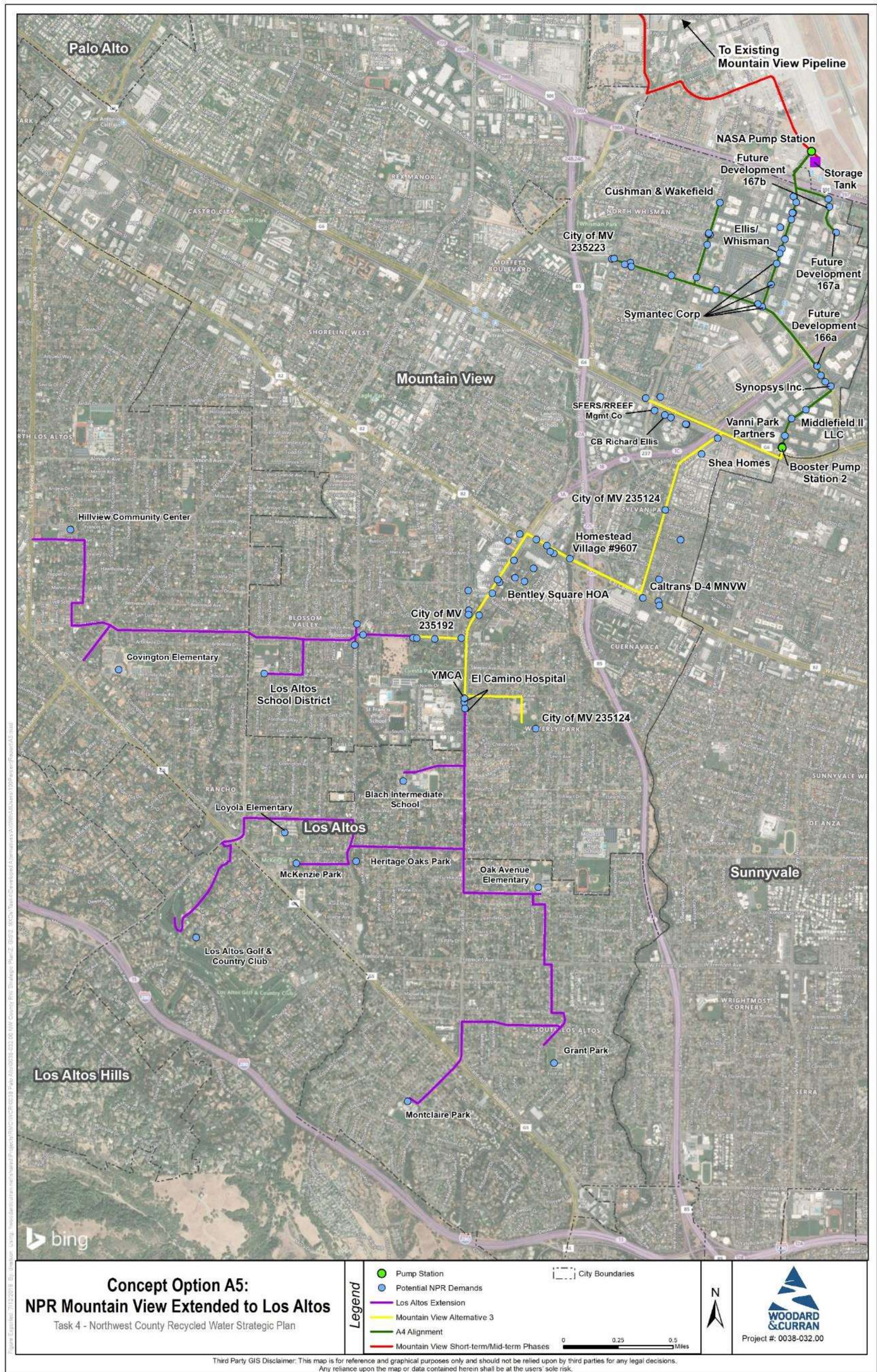
Table 3-7: Demand and Facilities Summary of Concept Option A5, NPR Mountain View Extended to Los Altos

Customer Location	Number of Users	Demand Total (AFY)
Mountain View – Long-Term Expansion	42	216
Mountain View – Alternative 3	53	274
Additional Mountain View Site	1	12
Los Altos	10	370
Total	106	872

Modeled Pipe ID (in)	Approximate Length of Pipe (LF)
6	21,600
8	14,900
10	5,600
16	45,000
Total Length (LF)	87,100
Total Length (mi)	16.5

Storage Tank	1.2 MG	
Description	Performance Requirements	
	NASA Pump Station (PS1)	Booster Pump Station #2 (PS2)
Required Flow	3,031 gpm	1,799 gpm
Discharge Head	190 ft	187 ft
Pump Configuration (duty + standby)	3+1	2+1
Pump Motor Rating (each)	75 hp	75 hp
Total Installed Motor Horsepower	300 hp	225 hp

Figure 3-6: Alignment for Concept Option A5, NPR Mountain View Extended to Los Altos



3.3.6 Concept Option A6: NPR East Palo Alto and Menlo Park

Concept Option A6 would serve customers (including yet to be constructed customers) in East Palo Alto, with facilities sized to extend to areas of developments in Menlo Park that are east of U.S. Highway 101. Menlo Park does not currently use any recycled water and does not own or operate a wastewater treatment facility. Menlo Park has expressed interest in receiving recycled water supplies from other agencies, including Redwood City, West Bay Sanitary District, and Palo Alto's RWQCP (West Yost, 2017). The Concept Option A6 alignment and customer demands are shown in Figure 3-7. A summary of the customers included in this concept option and their corresponding facilities are outlined in Table 3-8.

Notable items from Concept Option A6 are:

- Customers: Potential demand for Menlo Park was obtained through discussions with Menlo Park and WBSD, both of which have conducted recycled water assessments for this area. Note that East Palo Alto is continuing to see increases in development such that these demand estimates may be lower than actuals.
- Pipelines: Builds off of the existing 30-inch recycled water backbone along Embarcadero Road.
- Pump Stations: One – expanded existing recycled water pump station at RWQCP

Table 3-8: Demand and Facilities Summary for Concept Option A6, NPR East Palo Alto and Menlo Park

Customer Location	Number of Users	Demand Total (AFY)
East Palo Alto	10	145
East Palo Alto – yet to be constructed	17	192
Palo Alto	6	114
Subtotal	33	451
Menlo Park	N/A ¹	250
Total		701

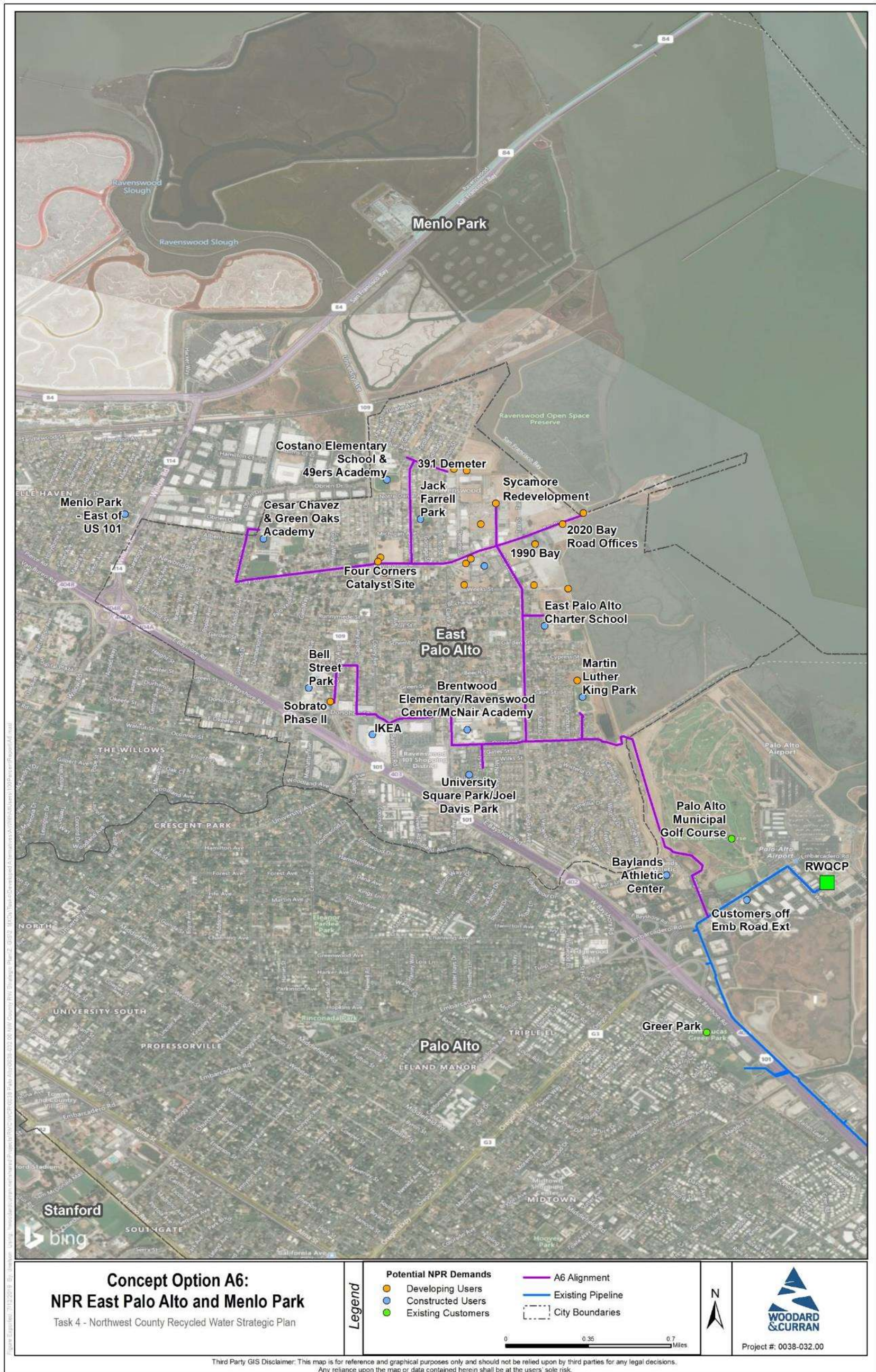
Modeled Pipe ID (in)	Approximate Length of Pipe (LF)
6	14,100
8	10,200
10	10,000
Total Length (LF)	34,300
Total Length (mi)	6.5

Description	Performance Requirements
	Recycled Water Pump Station (PS1)
Required Flow	1,000 gpm
Discharge Head	250 ft
Pump Configuration (duty + standby)	2+1
Pump Motor Rating (each)	50 hp
Total Installed Motor Horsepower	150 hp

Note:

1. The number of users in Menlo Park was not identified as part of the Strategic Plan. The estimated demand is based on discussions with Menlo Park and WBSD.

Figure 3-7: Alignment for Concept Option A6, NPR East Palo Alto and Menlo Park



3.4 Concept Option B: NPR from Satellite Location

3.4.1 Concept Option B1: NPR Satellite Treatment Plant

Concept Option B1 is a satellite treatment plant that would treat wastewater flows from a more proximate location to recycled water customers compared to the RWQCP. Based on a planning-level assessment of wastewater flow volumes available in the Study Area, the satellite plant would treat wastewater from Los Altos to provide NPR water to customers in Palo Alto and Los Altos. The Concept Option B1 alignment and the locations of the satellite treatment plant and customer demands are shown in Figure 3-8. A summary of the customers included in this concept option and their corresponding facilities are outlined in Table 3-9.

Notable items from Concept Option B1 are:

- Location: The satellite plant could be located at Robles Park in Palo Alto and would treat wastewater from Los Altos.
- Customers: Customers would be located nearby in Los Altos and in Palo Alto
- Pump Stations: Four – 1 raw influent pump station to feed wastewater to the satellite plant and three to distribute and boost recycled water to customers
- Storage: Satellite plant would include 1.4 MG of treated water storage to meet peak hour demands

Treatment Facilities

A potential site for the satellite facility is Robles Park in Palo Alto. Due to the urban setting of the Study Area, there are limited opportunities to site new treatment facilities. There are no vacant properties in the immediate vicinity of the sewer diversion point. Robles Park was identified as a potential site because it is a public property and has sufficient open space to accommodate the satellite facilities. Although, public use of the treatment plant site would be lost. For purposes of this study, the facilities are assumed to be above ground at Robles Park. Use of Robles Park would also require City Council adoption of a Parks Improvement Ordinance approving any substantial construction or development per Palo Alto Municipal Code 22.08.005. However, if this concept option were to be pursued further, alternative treatment facility siting may be considered, for example purchasing private property closer to the diversion point or siting facilities below ground at Robles Park.

Pipelines

Concept Option B1's distribution system would consist of approximately 12.8 miles of pipeline, including 6,000 LF of pipeline to convey influent wastewater flows from the sewer diversion point to the satellite treatment facilities.

Pump Stations

To meet the pressure criteria, Concept Option B1 includes three pump stations: one at the satellite plant site and two booster pump stations at optimized locations on the Phase 3 alignment and in Los Altos.

In addition, a Satellite Influent Pump Station is required to transport raw wastewater flows from the diversion point at the end of the Los Altos sewer system to the satellite treatment facility in Palo Alto. This influent pump station is co-located at the Pump Station #3 site.

Storage Tank Sizing

In order to meet demands during peak hours, Concept Option B1 requires a storage tank. The storage tank is sized to store the maximum day demands for this concept option (1.4 MG) and is assumed to be sited next to the satellite treatment plant.

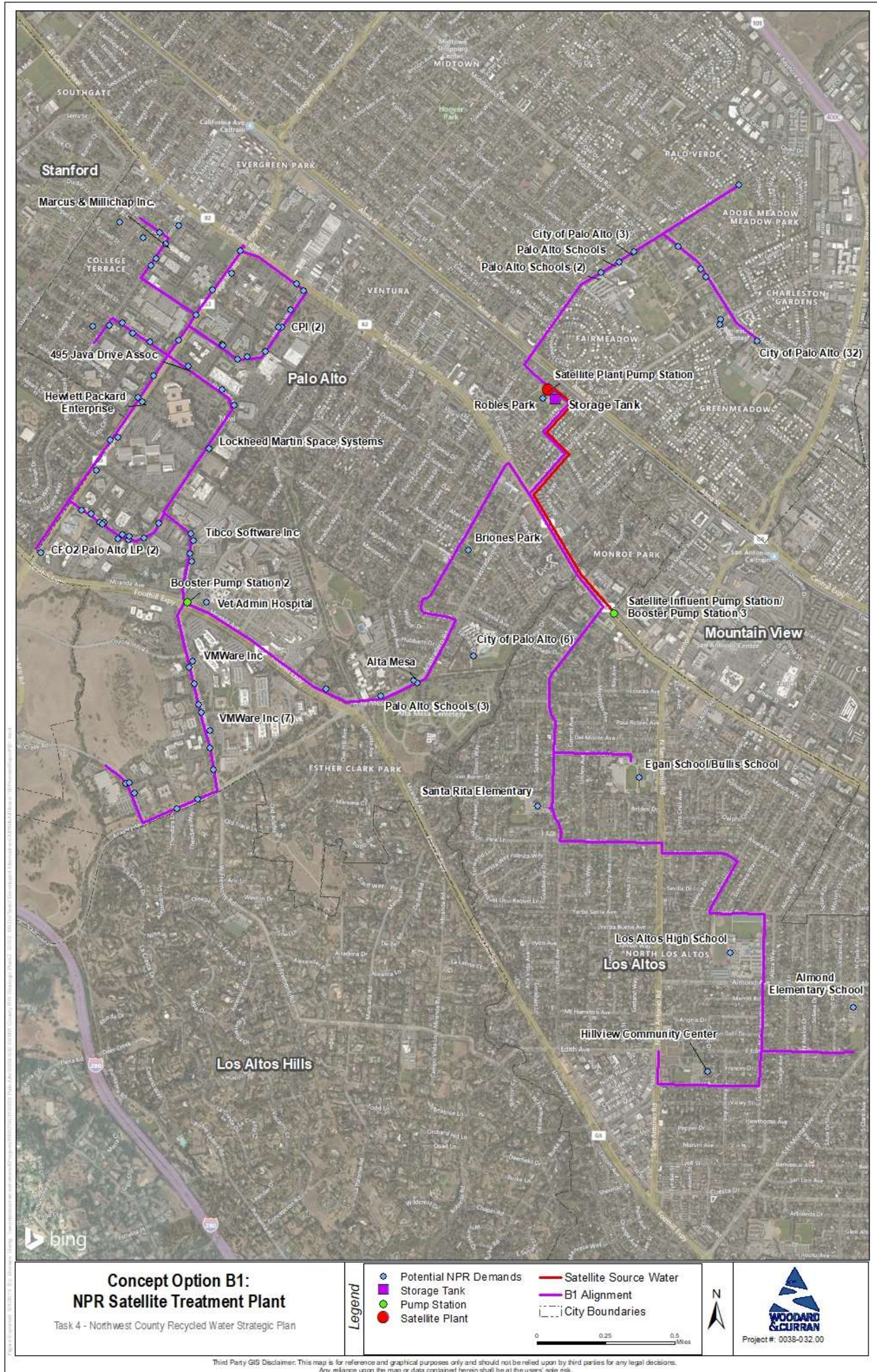
Table 3-9: Demand and Facilities Summary for Concept Option B1, NPR Satellite Treatment Plant

Customer Location	Number of Users	Demand Total (AFY)		
Palo Alto – Phase 3 ²	83	595		
Palo Alto – Non-Phase 3	2	28		
Anchor Customer No. 1 ¹	1	167		
Los Altos	5	104		
Total	91	894		
Treatment (MBR)		1.5 MGD		
Modeled Pipe ID (in)		Approximate Length of Pipe (LF)		
6		39,800		
8		4,000		
10		6,400		
12		11,500		
16 (influent to satellite plant)		6,000		
Total Length (LF)		67,700		
Total Length (mi)		12.8		
Storage Tank		1.4 MG		
Description		Performance Requirements		
	Satellite Plant Pump Station (PS1)	Booster Pump Station 2 (PS2)	Booster Pump Station 3 (PS3)	Satellite Influent Pump Station (PS4)
Required Flow	1,676 gpm	416 gpm	329 gpm	1,979 gpm
Discharge Head	252 ft	204 ft	288 ft	75 ft ³
Pump Configuration (duty + standby)	4+1	2+1	2+1	2+1
Pump Motor Rating (each)	40 hp	20 hp	20 hp	2 hp
Total Installed Motor Horsepower	200 hp	60 hp	60 hp	6 hp

Notes:

1. Anchor Customer No. 1 is distinguished from the rest of the Phase 3 customers because this customer relies on groundwater for its water supply and does not receive water from Palo Alto.
2. These customers represent a subset of Phase 3 alignment customers from Concept Option A1.
3. Required discharge head at the Satellite Influent Pump Station is notably smaller due to the 30-foot elevation decrease from its location to the satellite facility site.

Figure 3-8: Alignment for Concept Option B1, NPR Satellite Treatment Plant



3.5 Concept Option C: IPR Concept Options

3.5.1 Concept Option C1: Palo Alto Dedicated IPR

Concept Option C1 was developed as Scenario 4 under the IPR Feasibility Evaluation (Todd 2018). Concept Option C1 provides purified water for injection at five injection well sites in Palo Alto. The Concept Option C1 alignment and the locations of injection wells are shown in Figure 3-9. As discussed in Section 2.3.2, the volume of fully advanced treated recycled water that can be used for injection purposes is 2,800 AFY, while the volume of water that can be sustainably extracted from the groundwater basin (or the Project Yield) is 5,900 AFY (a mixture of recycled water and groundwater). These values are summarized in Table 3-10.

Notable items from Concept Option C1 are:

- Treatment: full advanced treatment facilities are assumed to be constructed near the RWQCP on the Measure E site. Use of this site would require Palo Alto voter approval to change the designated use to include treatment facilities. Fully advanced treated recycled water would be injected and mixed into the local groundwater system.
- Customers: Palo Alto potable water system customers.
- Pipeline: Dedicated pipeline to bring fully advanced treated recycled water from treatment facilities at the RWQCP to the injection wells.
- Pump Stations: One – dedicated pump station for purified recycled water at RWQCP

Table 3-10: Demand and Facilities Summary for Concept Option C1, Palo Alto Dedicated IPR

Customer Location	Demand Total (AFY)	Project Yield (AFY)
Palo Alto - IPR Injection Wells	2,800	5,900
Modeled Pipe ID (in)	Approximate Length of Pipe (LF)	
6	2,000	
8	1,500	
10	5,000	
12	21,000	
Total Length (LF)	29,500	
Total Length (mi)	5.6	
Description	Performance Requirements	
	Purified Recycled Water Pump Station (PS1)	
Required Flow	1,736 gpm	
Discharge Head	269 ft	
Pump Configuration (duty + standby)	2+1	
Pump Motor Rating (each)	100 hp	
Total Installed Motor Horsepower	300 hp	
Recycled Water Treatment	Wellhead Treatment	
Membrane Filtration, Reverse Osmosis, Advanced Oxidation Process with UV	Included to lower iron, manganese, and TDS concentrations	

Treatment Facilities

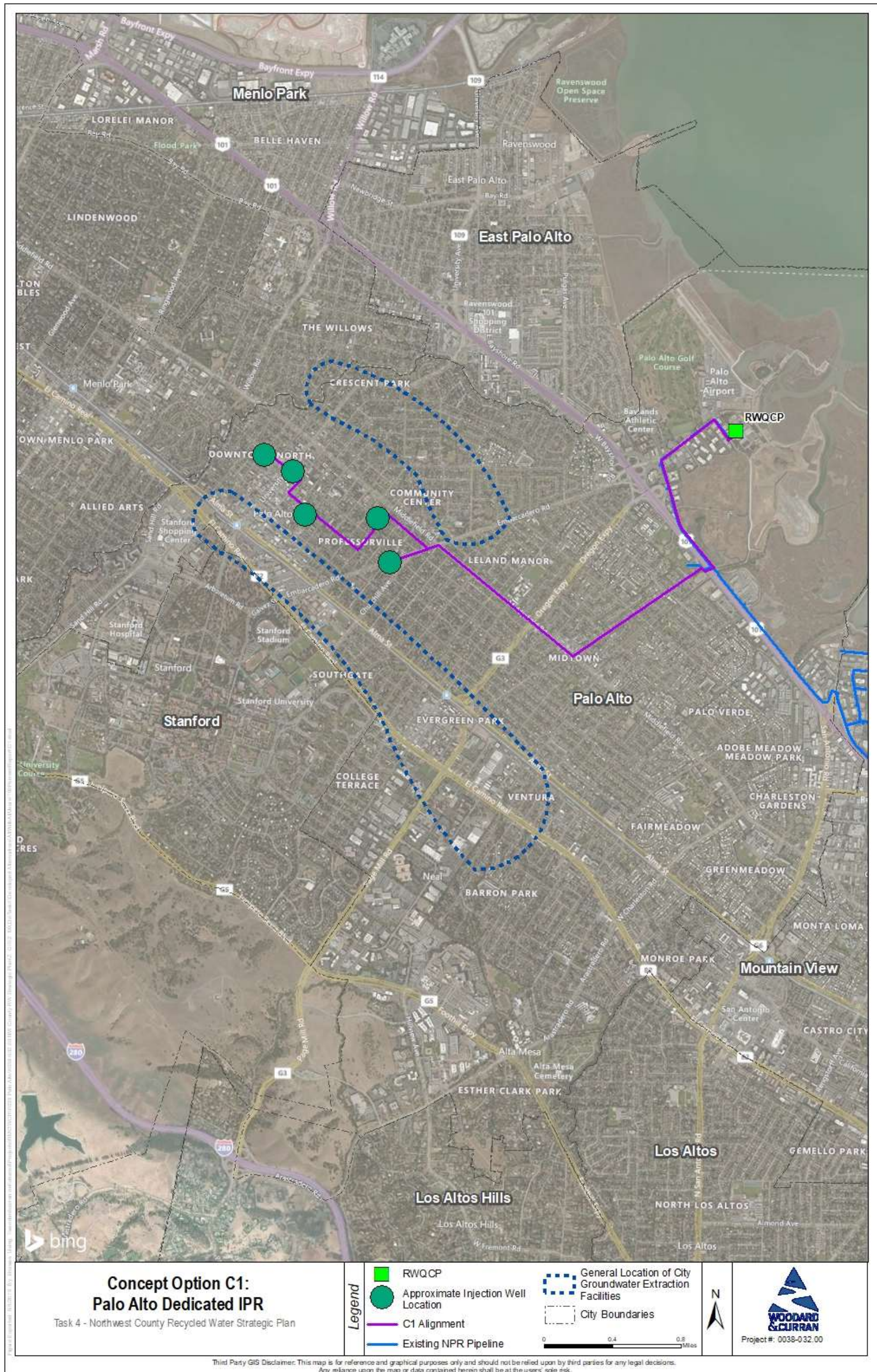
Recycled water from the RWQCP would be treated to full advanced treatment standards for injection. The treatment facilities would be sized to produce 2.5 MGD to meet the daily flow required to be injected into the groundwater basin to achieve 2,800 AFY. This assumes each of the five proposed injection wells is constantly operating and does not account for downtime. The treatment facilities for this concept option are assumed to be sited at Palo Alto's Measure E Site. The Measure E site is a 10-acre site adjacent to the RWQCP that includes a relatively flat portion that could be suitable for treatment facilities. Use of this site would require Palo Alto voter approval to change the designated use to include treatment facilities.

Wellhead treatment is included to lower iron, manganese, and TDS concentrations to make the groundwater quality comparable to Palo Alto's existing SFPUC supply.

Pipelines

Concept Option C1's distribution system would consist of approximately 5.6 miles of pipeline. A dedicated IPR transmission main would be needed to convey fully advanced treated recycled water from the RWQCP to the injection well field while the existing recycled water pipeline would continue to deliver disinfected tertiary recycled water to non-potable demands.

Figure 3-9: Alignment for Concept Option C1, Palo Alto Dedicated IPR



3.5.2 Concept Option C2: Palo Alto IPR with NPR

Concept Option C2 expands upon Concept Option C1 to include service of non-potable demands along or in close proximity to the alignment. Both uses (IPR and NPR) would share a transmission line and consequently, fully advanced treated recycled water would be served to all customers in this concept option despite the additional treatment being unnecessary for NPR.

The Concept Option C2 alignment is shown in Figure 3-10. A summary of the customers included in this concept option and their corresponding demands are outlined in Table 3-11. As discussed in Section 2.3.2, the volume of fully advanced treated recycled water that can be used for NPR and injection purposes is 2,800 AFY, while the volume of water that can be sustainably extracted from the groundwater basin (or the Project Yield) is 5,900 AFY (a mixture of recycled water and groundwater). These values are summarized in Table 3-11.

Notable items from Concept Option C2 are:

- **Treatment:** Full advanced treatment is assumed to be constructed near the RWQCP on the Measure E site. Use of this site would require Palo Alto voter approval to change the designated use to include treatment facilities. Fully advanced treated recycled water would be injected and mixed into the local groundwater system.
- **Customers:** Palo Alto potable water system customers and 18 non-potable customers along the pipeline route. Both potable and non-potable customers would receive fully advanced treated recycled water due to use of the same transmission pipeline despite the additional treatment being unnecessary for NPR customers.
- **Pipeline:** Dedicated pipeline to bring fully advanced treated recycled water from treatment facilities at the RWQCP to the injection wells will also serve non-potable demands in close proximity (with higher quality fully advanced treated recycled water).
- **Pump Stations:** One – dedicated pump station for purified recycled water at the RWQCP.

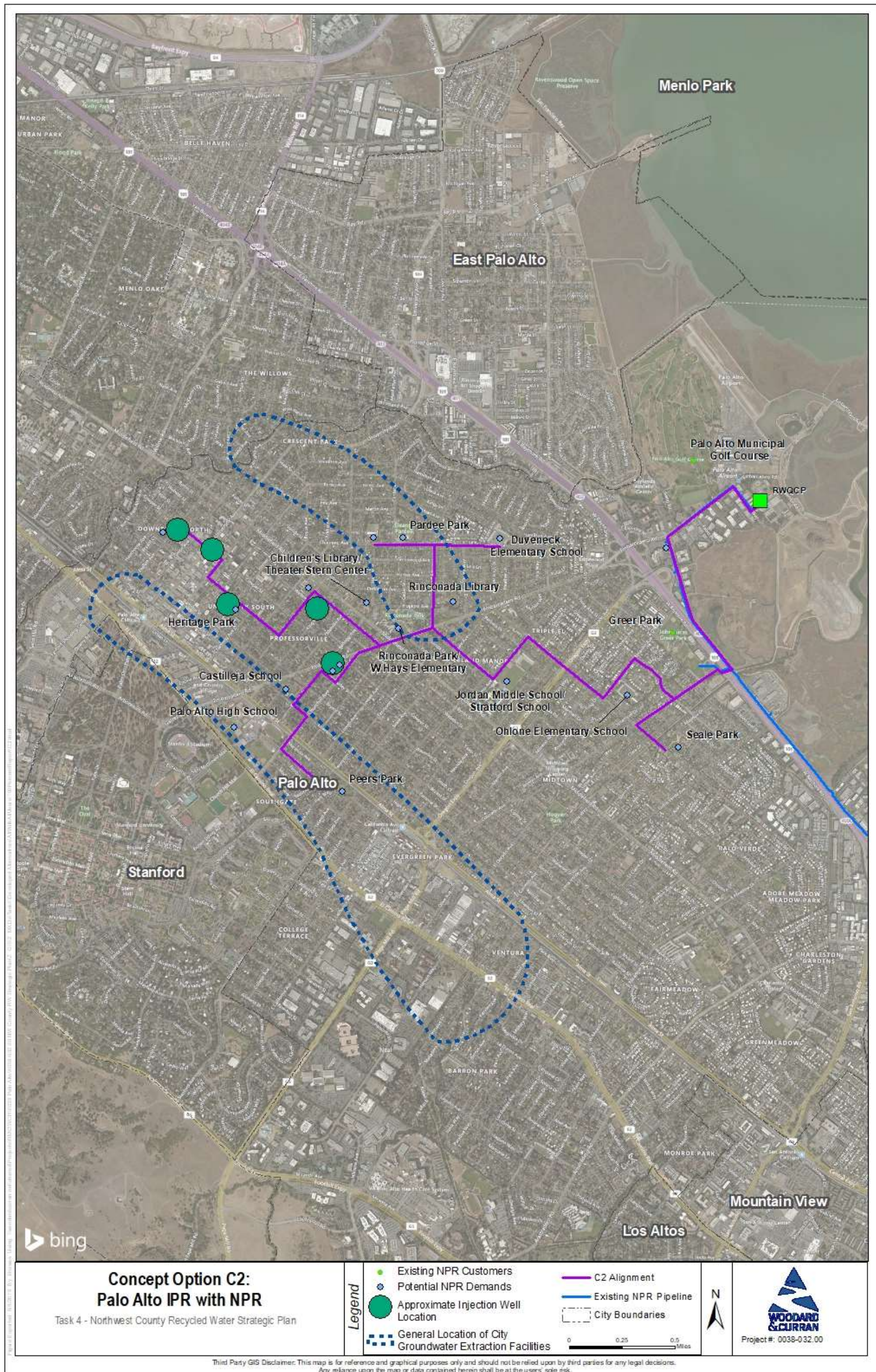
Treatment Facilities

RWQCP recycled water will be treated to full advanced treatment standards for injection. Because the potable and non-potable demands will be served from the same pipeline, the treatment facilities must be sized to treat the base flows to the injection wells plus the maximum day demand for the non-potable users. This translates to a total maximum day demand of 2.8 MGD. The treatment facilities for this concept option, which would include reverse osmosis concentrate treatment facilities (see Section 3.2.3), are assumed to be sited at Palo Alto's Measure E site. Use of this site would require Palo Alto voter approval to change the designated use to include these treatment facilities. Wellhead treatment is included to lower iron, manganese, and TDS concentrations to make the groundwater quality comparable to Palo Alto's existing SFPUC supply.

Table 3-11: Demand and Facilities Summary for Concept Option C2, Palo Alto IPR with NPR

Customer Location	Number of Users	Demand Total (AFY)	Project Yield (AFY)
Palo Alto – Non-Phase 3	18	189	189
IPR Injection Wells	-	2800	5900
Total	18	3,000	6,100
Modeled Pipe ID (in)		Approximate Length of Pipe (LF)	
6		11,300	
8		5,500	
10		3,000	
12		2,500	
16		19,100	
Total Length (LF)		41,400	
Total Length (mi)		7.8	
Description	Performance Requirements		
	Purified Recycled Water Pump Station (PS1)		
Required Flow	2,334 gpm		
Discharge Head	265 ft		
Pump Configuration (duty + standby)	4+1		
Pump Motor Rating (each)	60 hp		
Total Installed Motor Horsepower	300 hp		
Recycled Water Treatment	RO Concentrate Treatment		
Membrane Filtration, Reverse Osmosis, Advanced Oxidation Process with UV	Needed due to total reuse quantity; nanofiltration assumed (MNS, 2017)		
Wellhead Treatment			
Included to lower iron, manganese, and TDS concentrations			

Figure 3-10: Alignment for Concept Option C2, Palo Alto IPR with NPR



3.5.3 Concept Option C3: Palo Alto IPR and NPR from Phase 3 Pipeline

Concept Option C3 is similar to Concept Option C2 but uses an extension from the Phase 3 Pipeline (Concept Option A1) to serve the injection well sites. Similar to Concept Option C2, fully advanced treated recycled water would be served to all customers (NPR and IPR) in this concept option. Concept Option C3 is unique in that it assumes that the Phase 3 Pipeline for NPR has already been constructed and flows to the injection well field are limited by the excess capacity in the Phase 3 Pipeline during off-peak hours and outside of the peak irrigation season. This concept option mitigates the risk of decreasing NPR demand along the Phase 3 Pipeline and would enable phased implementation with NPR in the near term and IPR in the longer term.

The Concept Option C3 alignment is shown in Figure 3-11. A summary of the customers included in this concept option and their corresponding demands are outlined in Table 3-12. The values shown assume the estimated demand for the Phase 3 Pipeline is maintained, which allows for approximately 2,280 AFY to be sent to IPR versus the 2,800 AFY in Concept Options C1 and C2. Correspondingly the project yield (total of recycled water and groundwater) was reduced to 5,000 AFY from 5,900 AFY.

Notable items from Concept Option C3:

- **Phasing:** Concept Option C3 represents a potential phased implementation with NPR in the near term and IPR in the longer term.
- **Treatment:** Full advanced treatment facilities are assumed to be constructed near the RWQCP on the Measure E site. Use of this site would require Palo Alto voter approval to change the designated use to include treatment facilities. Fully advanced treated recycled water would be injected and mixed into the local groundwater system.
- **Customers:** In a future phase, customers on the Phase 3 Pipeline would receive fully advanced treated recycled water through a new dedicated connection from the RWQCP. Both potable and non-potable customers would receive fully advanced treated recycled water due to use of same transmission pipeline despite the additional treatment being unnecessary for NPR customers.
- **Pipeline:** Includes the Phase 3 Pipeline (Concept Option A1) and, in a future phase, a new connection from the RWQCP full advanced treatment facilities to Phase 3 and an extension to IPR injection wells.

Treatment Facilities

Recycled water from the RWQCP would be treated to full advanced treatment standards for injection. Because the potable and non-potable demands would be served from the same pipeline, the treatment facilities must be sized to treat both the flows to the injection wells plus the flows to the non-potable users, or 3.3 MGD. The non-potable demands will be served by nearly potable water. This concept option includes reverse osmosis concentrate treatment (see 3.2.3) that is assumed to be sited at Palo Alto's Measure E site. Use of this site would require Palo Alto voter approval to change the designated use to include treatment facilities. Wellhead treatment is included to lower iron, manganese, and TDS concentrations to make the groundwater quality comparable to Palo Alto's existing SFPUC supply.

Pump Stations

To meet the pressure criteria, Concept Option C3 includes an additional pump station beyond the ones identified for the Phase 3 Pipeline (Concept Option A1). This additional pump station would be at the connection between the Phase 3 Pipeline and the IPR extension pipeline.

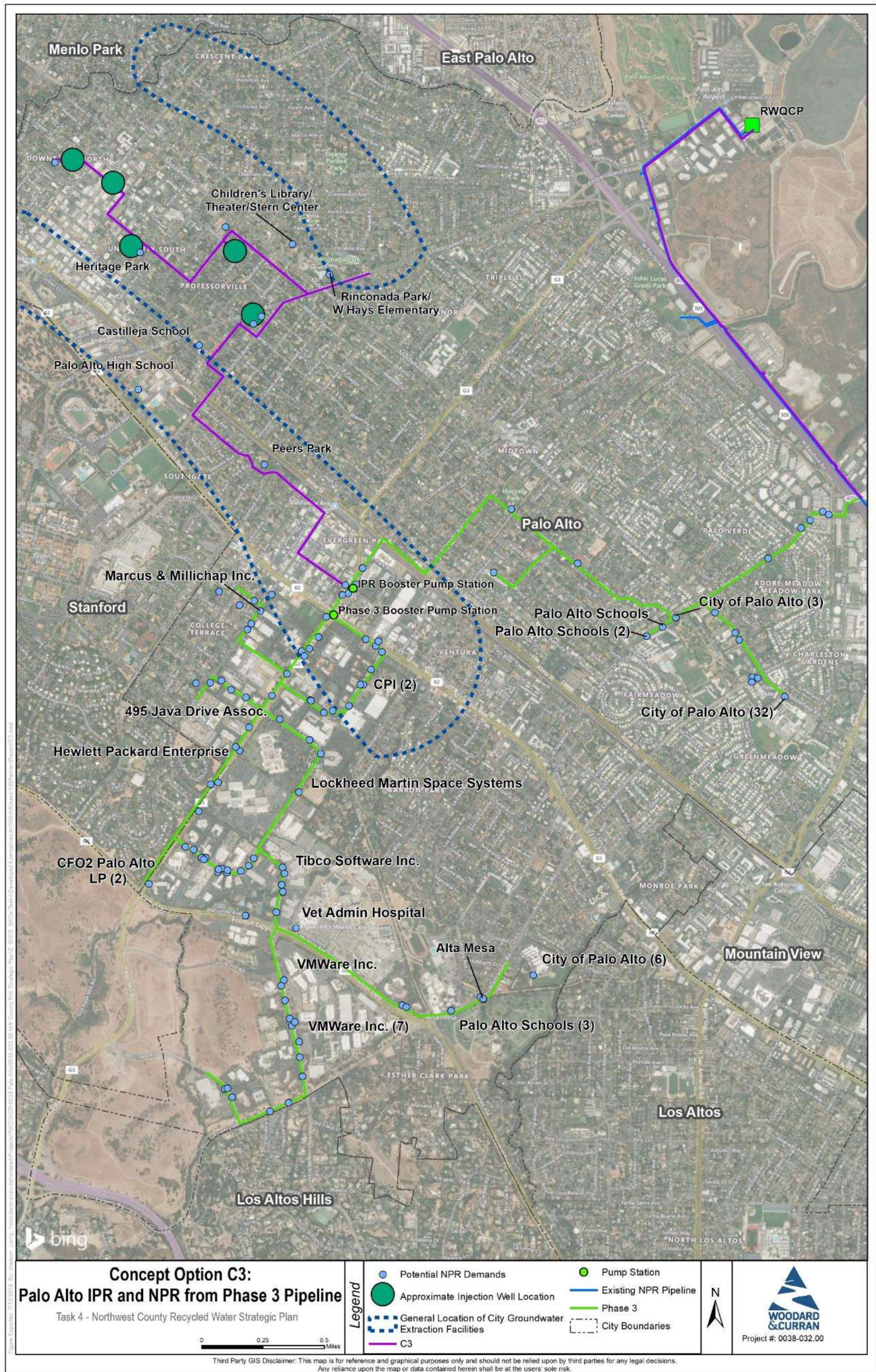
Table 3-12: Demand and Facilities Summary for Concept Option C3, Palo Alto IPR and NPR from Phase 3 Pipeline

Customer Location	Number of Users	Demand Total (AFY)	Project Yield (AFY)
Palo Alto – Phase 3	109	634	634
Anchor Customer No. 1 ¹	1	167	167
Palo Alto – Non-Phase 3	10	119	119
Palo Alto – IPR Injection Wells	-	2,280	5,000
Total	120	3,200	5,900
Modeled Pipe ID (in)		Approximate Length of Pipe (LF)	
6		20,000	
8		12,500	
10		9,900	
12		48,300	
16		900	
Total Length (LF)		91,600	
Total Length (mi)		17.3	
Description	Performance Requirements		
	IPR Booster Pump Station (PS1)	Recycled Water Pump Station	Phase 3 Booster Pump Station
Required Flow	2,108 gpm	1,637 gpm	1,408 gpm
Discharge Head	302 ft	200 ft	198 ft
Pump Configuration (duty + standby)	3+1	2	3+1
Pump Motor Rating (each)	100 hp	100 hp	60 hp
Total Installed Motor Horsepower	400 hp	200 hp	240 hp
Recycled Water Treatment		RO Concentrate Treatment	
Membrane Filtration, Reverse Osmosis, Advanced Oxidation Process with UV		Needed due to total reuse quantity; nanofiltration assumed (MNS, 2017)	
Wellhead Treatment			
Included to lower iron, manganese, and TDS concentrations			

Notes:

1. Anchor Customer No. 1 is distinguished from the rest of the Phase 3 customers because this customer relies on groundwater for its water supply and does not receive water from Palo Alto.

Figure 3-11: Alignment for Concept Option C3, Palo Alto IPR and NPR from Phase 3 Pipeline



3.6 Concept Option D: DPR Concept Options

3.6.1 Concept Option D1: Palo Alto Dedicated DPR

Concept Option D1 uses advanced treated recycled water to directly supplement the potable water supply for customers in Palo Alto. As discussed in Section 2.4, because there is no dedicated surface water treatment plant in the service area, treated drinking water augmentation is the only feasible DPR option available at this time.

Treated water would be stored in a purified water tank for 8 hours and delivered to the potable water distribution system. A map showing the approximate alignment and connection points to the potable water system for Concept Option D1 is shown in Figure 3-12. As explained in Section 2.4.2, the demand for DPR (Table 3-13) was based on Palo Alto's share of the RWQCP effluent flow.

Notable items from Concept Option D1:

- **Treatment:** Full advanced treatment plus other treatment process facilities are assumed to be constructed near the RWQCP on the Measure E site. Use of this site would require Palo Alto voter approval to change the designated use to include these facilities. Fully advanced treated recycled water would be injected directly into the potable distribution system. Additional monitoring and reporting of treatment performance is anticipated to demonstrate protection of public health.
- **Customers:** Palo Alto potable water system customers.
- **Pump Stations:** Two pump stations: one to convey fully advanced treated recycled water to storage (Storage Pump Station) and one from the storage to the distribution system (Distribution Pump Station).
- **Pipeline:** Connects from treatment facilities to storage and from storage to potable water system at three separate points to add in blending and to match existing potable water system hydraulics.
- **Storage:** Engineered storage of 4.75 MG is assumed to be located beneath the Palo Alto Municipal Golf Course driving range.

Treatment Facilities

Consistent with the SWRCB's Feasibility Report on Developing Uniform Water Recycling Criteria for DPR, the water quality of the influent wastewater for DPR was assumed to be final effluent from the RWQCP (filtered and disinfected secondary effluent). Without specific regulatory requirements, the assumed Advanced Water Purification Facility (AWPF) treatment train is the full advanced treatment train with the additions of ozone-biologically active filtration and free chlorine process steps. In order to comply with the RWQCP discharge limits, facilities to treat the reverse osmosis concentrate would also be part of the AWTP. The AWTP treatment facilities are assumed to be sited at Palo Alto's Measure E site. Use of this site would require Palo Alto voter approval to change the designated use to include these facilities. Additional monitoring and reporting of treatment performance is anticipated for DPR to demonstrate protection of public health. Concept Option D1 includes additional annual costs to reflect this additional, but undefined by regulations, monitoring.

Storage Tank Sizing

It is anticipated that an engineered storage buffer will be required between the AWPF and introduction of purified water to the potable distribution system. A potential location for this tank is beneath the Palo Alto Municipal Golf Course driving range. A preliminary estimate of the storage tank operational volume needed to serve Concept Option D1 users is 4.75 MG assuming 8 hours of cycling storage (filling, testing, and distributing from three different cells within the storage tank operational volume).

Table 3-13: Demand and Facilities Summary for Concept Option D1, Palo Alto Dedicated DPR

Customer Location	Demand Total (AFY)	
Palo Alto	5,300	
Modeled Pipe ID (in)	Approximate Length of Pipe (LF)	
10	5,000	
16	1,700	
18	1,400	
24	2,600	
Total Length (LF)	10,700	
Total Length (mi)	2.0	
Description	Performance Requirements	
	To Storage Pump Station (PS1)	Distribution Pump Station (PS2)
Required Flow	4,382 gpm	3,285 gpm
Discharge Head	31 ft	257 ft
Pump Configuration (duty + standby)	3+1	3+1
Pump Motor Rating (each)	15 hp	100 hp
Total Installed Motor Horsepower	60 hp	400 hp
Recycled Water Treatment	RO Concentrate Treatment	
Ozone, Biologically Active Filtration, Membrane Filtration, Reverse Osmosis, Advanced Oxidation Process with UV, Free Chlorine	Needed due to total reuse quantity; nanofiltration assumed (MNS, 2017)	
Storage		
4.75 million gallons		

Figure 3-12: Alignment for Concept Option D1, Palo Alto Dedicated DPR



Chapter 4 Strategic Plan Concept Options Evaluation

4.1 Approach for Concept Options Evaluation

The concept options described in Chapter 3 were evaluated for estimated costs (e.g., capital, annual, unit cost of water) and for non-cost criteria. Section 4.2 describes the basis of the preliminary cost estimates while Section 4.3 presents the cost information by concept option. Section 4.4 describes the non-cost criteria scoring. Section 4.5 provides the evaluation of concept options with weighted scores for cost and non-cost criteria.

Each concept option was evaluated for implementation costs (capital, operations, maintenance) based on technical information developed by the consulting team, described in Chapter 3, and using an approach for planning-level costs development discussed in this chapter. Following the implementation cost development, the concept options were evaluated for non-cost related criteria in a collaborative approach using input from agency stakeholders on priorities for the criteria and how to weigh criteria relative to one another.

4.2 Basis of Preliminary Cost Estimate

This section provides an overview of the approach and methodology used to develop a preliminary estimate of costs for each concept option developed in this study. The estimated costs represent the Engineer's opinion based on the current state of development for the project components. Specific information on the unit costs and source for each element is identified in the unit cost spreadsheets that are part of the detailed cost estimate provided in Appendix D.

4.2.1 Cost Estimate Classification

The Association for the Advancement of Cost Engineering International (AACE International) has developed a cost estimate classification system that provides guidelines for applying the general principles of estimate classification to project cost estimates. The five estimate classes are presented in AACE International Recommended Practice No. 56R-08 (Cost Estimate Classification System – As Applied for the Building and General Construction Industries). The guideline establishes a relationship between the project maturity (i.e. project definition as percent of complete definition) and the accuracy and methodology used to produce the cost estimate. Based on the level of project definition, the cost estimates developed for this report are Class 5 as defined by Publication 56R-08. The accuracy range for Class 5 estimates in the Strategic Plan is between 20% below and 50% above estimated bid cost.

4.2.2 Cost Estimating Approach

Cost estimates have been developed based on preliminary facility layouts and design criteria for pipeline alignments and pump stations. Construction costs were estimated using unit costs developed from past construction projects, industry cost estimate resources (primarily RSMeans Heavy Construction Cost Data) as well as engineering allowances based on engineering judgement and previous project experience. Operations and maintenance (O&M) costs are based on estimated labor hours, consumables, significant regular O&M activities (e.g. recoating of exposed metallic surfaces) and energy costs.

Raw Construction Cost

Raw construction costs are estimated by major work or component line item based on a unit cost multiplied by estimated quantity. Unit costs were developed using:

- RSMeans Heavy Construction Cost Data (RSMeans);
- Manufacturer's equipment proposals; and
- Experience with prior projects and activities of similar size or configuration.

Historic unit cost or out-of-area unit cost information was adjusted to June 2018 dollars for the project vicinity using Engineering News Record's (ENR) Construction Cost Index (CCI) and the RSMeans Location Factor.

Cost Estimate Benchmark Index

The concept options' preliminary cost estimates presented herein are benchmarked to ENR CCI for San Francisco. The estimate is in June 2018 dollars, with an ENR CCI SF index of 12,015.

Construction Cost Allowances and Contingencies

From the raw construction cost subtotal, several construction cost factors are applied to develop an estimated total construction cost. The construction cost factors used are listed below.

- **9% Sales Tax on Materials.** Sales tax on materials was estimated as 9.0% (local sales tax) applied to 50% of capital costs (not including General Requirement costs). The assumption is that materials and equipment represent 50% of the raw construction cost.
- **40% Construction Contingency.** The construction contingency is defined as unknown costs due to incomplete engineering during the preliminary design phase and uncertainty about full scope of the project. The contingency is applied to the construction cost subtotal that are estimated as a percentage of defined project costs (i.e. raw construction cost subtotal). As the level of project definition and understanding increases and the level of unknown decreases, the construction contingency typically decreases. For this report, a construction contingency of 40% was applied to the raw construction cost estimates.
- **10% Market Adjustment Factor.** To account for bidding market price increases, a Market Adjustment Factor of 10% has been applied.

Capital Cost Allowances

- **15% Engineering Services (Design) & Administration Services.** Engineering services include field investigations (e.g. surveys, geotechnical reports, hazardous materials investigations), final design, contract document development (i.e. plans and specifications), preparation of detailed cost estimates, and project scheduling. Administration costs include Palo Alto's project management and staff time during construction. An engineering and City administrative services allowance of 15% was applied to the total construction cost.
- **10% Construction Management.** Costs for construction management, including inspection, can vary greatly with project size and complexity and whether the Owner performs this work with in-house staff or through a consultant. A construction management factor of 10% was applied to the total construction cost.
- **3% Engineering Services During Construction.** Engineering services during construction (ESDC) includes submittal and request for information reviews, design clarifications, and startup support services. An ESDC factor of 3% was applied to the total construction cost.

Property Acquisition

For facilities such as pump stations and satellite treatment located outside of the public right of way or outside the RWQCP, land would need to be purchased or leased. The market rate for the project area was assumed to be \$500 per square foot. These land costs were added to a concept option's total capital cost following the allowances and contingencies. Purchase or lease of land includes RWQCP partner-owned properties. However, in the case of Concept Option D1, Palo Alto Dedicated DPR, which assumes the engineered storage tank is beneath the Palo Alto Municipal Golf Course, acquisition of the land is not required since normal golf course operations can resume following construction. In order to account for

the potential loss of revenue due to construction of this storage facility, an allowance for loss of revenue was applied. This cost was added to total capital cost following all allowances and contingencies.

Property acquisition was not included for injection wells since the impact to properties is considered minimal.

Operations and Maintenance (O&M) Costs

O&M requirements and annual costs were derived from experience on similar projects, as well as input from Palo Alto. The three components used to develop annual O&M costs were:

- **Labor** – Labor costs associated with the water treatment and pump station O&M is calculated on an hourly basis. The required labor hours are estimated based on historical data. The average hourly cost of O&M personnel, which includes all wages and benefits to the operator, is assumed to be \$100 per hour. Annual inspection and maintenance for storage tanks were estimated as 1 percent of the total capital costs for that element, while conveyance O&M was based on a cost metric per linear foot of pipeline.
- **Energy** – Energy costs for pump stations are a combination of an energy charge (per kWh) and the kWh required input for each pump station in a concept option. Energy costs for treatment are estimated as a combined cost with consumables on a per unit of water basis (cost per MGD).
- **Consumables** – Consumables are a major component of operational expenditures and include resources that are intended and expected to be used and replaced routinely. Consumable costs for treatment were estimated on a per unit of water basis (cost per MGD). Consumable costs for pump stations were estimated as a percentage of the raw construction cost. Consumable costs are not applied to the pipeline portion of each concept option.

4.2.3 Wastewater/Recycled Water Treatment Construction Costs

Wastewater and recycled water treatment construction costs have been developed for each concept option, where needed, on a per MGD basis. Per MGD cost estimates for membrane bioreactor (MBR) and for the advanced treatment facilities (membrane filtration, reverse osmosis, advanced oxidation process with UV, ozone, biologically active filtration, chlorination) are based on previous project experience.

4.2.4 Pipeline Construction

Pipeline construction costs have been developed for each concept option as described in the following sections. Pipeline capital costs include open-cut, special crossing elements, and pipe rehabilitation.

Pipeline Construction Cost – Open Cut

The pipe material for open cut installation is assumed to be high density polyethylene (HDPE). Based on the estimated pressures within the system and a surcharge allowance, a pressure rating of 200 psi was chosen as a suitable pressure rating for the pipe network. The corresponding dimension ratio resulted in DR 11.

A pipeline cost estimating tool was used to generate unit costs for underground pipeline construction for HDPE ranging in size from 8- to 30-inch (nominal diameter) assuming an average of 5-foot depth of cover, in urban settings. The estimating tool uses the following to develop installed unit costs:

- Historical engineering and bid price data for HDPE pipelines, appurtenances, traffic control, potholing, cathodic protection, excess soil disposal tipping fees, and urban setting production rates.
- RSM means unit costs for trench shoring, excavation, backfill, backfill compaction, pavement, grinding and milling, aggregate base, and pavement restoration including valves, haul to disposal, labor/installation, and dewatering.

The tool contains various input parameters including depth of cover, type of trench backfill and source (i.e. import vs. native material), condition of soil (i.e. clean vs. contaminated), percentage of backfill to be imported, amount of traffic control needed (i.e. none, light, or heavy), percentage of alignment requiring dewatering, production rate, and valve and pothole frequency. Using these inputs, the tool estimates the construction quantities related to buried piping (i.e. excavation volume), and subsequently, the associated unit cost per length of pipe.

The unit costs are summarized in Table 4-1.

Table 4-1: Unit Cost of HDPE Pipe

Modeled Pipe Internal Diameter (ID) (in)	HDPE DR 11 ID (in)	HDPE DR 11 Nominal Outer Diameter (OD) (in)	Unit Cost (\$/LF)
6	6.96	8	\$200
8	8.68	10	\$212
10	10.29	12	\$254
12	12.92	16	\$277
16	16.15	20	\$334
18	19.37	24	\$381
24	24.22	30	\$462

Assumptions:

- Pipeline is in an urban setting
 - Asphalt concrete pavement replacement would be the width of the trench plus 6-inches on each side
 - Heavy traffic control required
 - One pothole per 100 LF of pipe required
- Average depth of cover of 5 feet
- 100% of soil excavated is hauled to a landfill or reused offsite and 100% of soil required for backfill is imported
- Isolation valves and other appurtenances amount to 20% of the pipeline material costs

Production rate is 150-linear feet of pipeline construction per day

Note: HDPE pipe sizes are IPS (outside diameter controlled) based on AWWA C906

Pipeline Construction Cost – Special Crossings

For special crossings (such as highway and creek crossings), a range of crossing methods was assessed for the preferred crossing method at each location. Following this assessment, Pilot Tube Guided Auger Boring (PTGAB) was considered the default method for all trenchless underground crossings. PTGAB is a costlier method compared to other trenchless techniques and may be required due to the concept option's smaller pipeline diameters and certain soil conditions in the Study Area. Therefore, it is a conservative basis for the purpose of developing a planning-level cost estimate. PTGAB is favorable in conditions with little to no groundwater; therefore, if further geotechnical investigations identify high groundwater along the pipeline route, another trenchless method should be considered.

Each special crossing was evaluated as a potential trenchless underground crossing, but where feasible, crossings were also evaluated for less costly construction methods. Therefore, non-trenchless installation methods were utilized where possible. This was applied when pipeline alignments crossed bridges and box culverts; it was assumed that under these specific conditions, a pipe bridge could be used rather than a trenchless method. Pipe bridges are generally lower cost and allow for reduced permitting efforts and traffic control during construction compared to trenchless methods.

Under the Phase 3 Pipeline design (Woodard & Curran 2018), feasible trenchless construction methods included microtunneling and horizontal directional drilling (HDD). Open cut methods were assumed when the alignment crossed over an existing culvert and there is adequate cover over the box culvert.

Table 4-2 summarizes the unit costs used for special crossings. These costs were developed based on a collection of past project experience and unit costs taken from RSMMeans.

Table 4-2: Special Crossing Unit Costs

Element	Unit	Unit Cost
<i>Trenchless</i>		
Microtunnel Launch Pit	Lump sum	\$300,000
Microtunnel Receiving Pit	Lump sum	\$150,000
Microtunnel Casing and Pipe (36-inch)	Linear foot	\$1,728
HDD (24-inch bore diameter)	Linear foot	\$528
PTGAB (HDPE)		
6-inch	Linear foot	\$375
8-inch	Linear foot	\$500
10-inch	Linear foot	\$625
12-inch	Linear foot	\$750
16-inch	Linear foot	\$1,000
20-inch	Linear foot	\$1,250
PTGAB Launch Pit	Lump sum	\$258,000
PTGAB Receiving Pit	Lump sum	\$148,000
Pipe Bridge (DIP, Class 50, Mechanical Joint)		
6-inch	Linear foot	\$66
8-inch	Linear foot	\$86
10-inch	Linear foot	\$108
16-inch	Linear foot	\$175
Pipe Bridge Support	Lump sum	\$5,000

Pipeline Construction Cost – Pipe Rehabilitation

Pipelines that serve Los Altos Hills under Concept Options A2 and A3 were assumed to convey recycled water via re-lined abandoned PHWD 6- and 8-inch cast iron pipe (CIP) water mains in Purissima Road. The 6- and 8-inch water mains were abandoned in 1995. The condition of the pipes is unknown but was assumed to be in relatively good condition. Under current recycled water demand projections, there is sufficient capacity in the existing pipes.

Cured-in-Place-Pipe (CIPP) lining was assumed to be the more practical method of rehabilitation compared to pipe bursting due to the minimal pipe cover depths, which were estimated by PHWD to be approximately three to four feet. The shallow cover could present problems of ground heave and soil displacement if pipe bursting were to take place.

CIPP lining costs, for both the 6- and 8-inch mains, were estimated from historical data. Unit costs include closed-circuit television inspection and minor cleaning prior to lining. Advanced cleaning

mechanisms to address instances of tuberculation and point repair to address structural deficiencies are not included in the cost.

4.2.5 Pump Station Construction Cost

Pump station costs for concept options were estimated using a pump cost curve based on each pump station's total installed motor horsepower. This cost curve is applicable to pump stations of average complexity. The pump cost curve was determined using the following equation:

$$\text{Cost} \left(\frac{\$}{\text{Horsepower}} \right) = 17437 * \text{Total Horsepower}^{-.36}$$

Pump station costs for Concept Option A1, Phase 3 Pipeline, including costs for the Phase 3 recycled water pump station and booster pump station were taken from the Phase 3 Preliminary Design Report (Woodard & Curran 2018).

Hydropneumatic and Surge Tanks Costs

Concept Options with multiple pump stations would benefit from the installation of recycled water tanks, but given the challenge of acquiring land in the Study Area to construct such tanks, hydropneumatic tanks were assumed instead. Hydropneumatic tanks would regulate system pressures to meet demand while acting as a cushion for pumps in series in a closed conduit system. Since the tanks contain both water and air under pressure, they can exert or absorb pressure throughout the system when needed.

Costs for surge tanks were also included for some concept options assuming the need to mitigate variations due to rapid changes in flow. A surge analysis would be required to determine the need for surge tanks. The tank costs were estimated from previous experience with projects of similar characteristics and configuration.

4.2.6 Extraction Well Treatment Construction Costs

For IPR concept options, wellhead treatment was assumed to be required at all extraction wells. The wellhead treatment capital and O&M costs were developed based on calculations completed for Palo Alto's 2017 Water Integrated Resources Plan. Wellhead treatment capital costs include reverse osmosis treatment for iron, manganese, and total dissolved solids (Option 4 from the 2000 Long Term Water Supply Study, updated for the 2017 Water Integrated Resources Plan). These wellhead treatment capital costs do not account for land acquisition. Therefore, separate land costs were developed for the Rinconada and Peers wells, which would require additional land to be purchased to locate wellhead treatment facilities. These land costs are also sourced from Palo Alto's 2017 Water Integrated Resources Plan.

In addition to wellhead treatment, O&M costs for extraction wells also included the Valley Water groundwater pumping charge. This cost was based on projected Valley Water rates for groundwater pumping in the Study Area.

4.3 Engineer's Opinion of Probable Cost Summary

Table 4-3 below provides a summary of probable capital and O&M costs, as well as unit costs, for each developed concept option. Detailed cost estimates are included in Appendix D.

Table 4-3: Summary of Engineer's Opinion of Probable Capital and O&M Costs

Concept Option ID & Name	Capital Cost	O&M (\$/Year)	Yield (AFY)	Unit Cost (\$/AF)
A1: NPR Palo Alto Phase 3	\$47,800,000	\$290,000	800	\$3,400
A2: NPR Palo Alto Phase 3 Extended to Foothills	\$63,000,000	\$520,000	1,100	\$3,400
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	\$85,100,000	\$680,000	1,200	\$4,000
A4: NPR Mountain View	\$6,200,000	\$100,000	200	\$2,100
A5: NPR Mountain View Extended to Los Altos	\$72,600,000	\$400,000	900	\$4,600
A6: NPR East Palo Alto	\$20,700,000	\$150,000	500	\$2,400
B1: NPR Satellite Treatment Plant	\$129,600,000	\$1,370,000	900	\$8,900
C1: Palo Alto Dedicated IPR	\$92,200,000	\$14,830,000	5,900	\$3,300
C2: Palo Alto IPR and NPR	\$152,100,000	\$16,920,000	6,100	\$4,000
C3: Palo Alto IPR and NPR from Phase 3	\$198,400,000	\$15,780,000	5,900	\$4,400
D1: Palo Alto Dedicated DPR	\$104,600,000	\$8,010,000	5,300	\$2,500

Note: Costs based on an ENR CCI June 2018 SF index of 12,015. Costs are consistent with a Class 5 estimate (-20% to +50%) (AACE 2008). Capital costs are amortized at 3% over 30 years.

4.4 Concept Option Evaluation Non-Cost Criteria

In evaluating concept options, Palo Alto and Valley Water solicited input from stakeholders on factors to consider in addition to cost. The stakeholders aided in developing the list of non-cost criteria and Palo Alto and Valley Water staff participated in the development of scoring rubrics to apply each non-cost criteria to the various concept options. The selected non-cost criteria are:

- Water Supply Resiliency
- Public Acceptance
- Adaptability
- Level of Agency Coordination
- Level of Customer Retrofits/Coordination
- Regulatory Complexity
- Institutional Complexity
- Regional Perspective
- Social and Economic Benefit
- Environmental Benefit

For each criterion, concept options could score up to 5 points. A description of the criteria, the scoring rubric for that criteria, and how each concept option scored with respect to those criteria are described in the following sections.

4.4.1 Water Supply Resiliency

This criterion evaluates concept options based on their total potential recycled water demand or amount of water supplied. Concept Options were scored as follows:

- 5 points: potential demands totaling > 2,000 AFY
- 4 points: potential demands totaling between 1,501 and 2,000 AFY
- 3 points: potential demands totaling between 1,001 and 1,500 AFY
- 2 points: potential demands totaling between 501 and 1,000 AFY
- 1 point: potential demands totaling \leq 500 AFY

Table 4-4: Concept Option Scores for Water Supply Resiliency

Concept Option ID	Score	Rationale
A1: NPR Palo Alto Phase 3	2	800 AFY
A2: NPR Palo Alto Phase 3 Extended to Foothills	3	1,100 AFY
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	3	1,250 AFY
A4: NPR Mountain View	1	200 AFY
A5: NPR Mountain View Extended to Los Altos	2	900 AFY
A6: NPR East Palo Alto	1	500 AFY
B1: NPR Sate Satellite Treatment Plant	2	900 AFY
C1: Palo Alto Dedicated IPR	5	2,800 AFY
C2: Palo Alto IPR and NPR	5	3,000 AFY
C3: Palo Alto IPR and NPR from Phase 3	5	3,200 AFY
D1: Palo Alto Dedicated DPR	5	5,300 AFY

Note. For IPR options, the rationale is based on purified recycled water yield.

4.4.2 Public Acceptance

Public acceptance criterion gauges the likelihood of potential customers accepting recycled water and continuing to use it for the foreseeable future. Customer acceptance of NPR is assumed to be greater than potable reuse. Public properties, which are mainly owned by agencies that have been engaged in the recycled water planning process, are assumed to be easier to convert to recycled water usage than privately owned properties. For potable reuse options, given initial feedback from members of the Palo Alto Utilities Advisory Commission and City Council at their respective study sessions held in 2018, DPR is assumed to have greater public acceptance than IPR.

Concept Options were scored as follows:

- 5 points: NPR concept options serving public properties only
- 4 points: NPR concept options including private properties but with customers (or an anchor customer) eager to accept recycled water or where a detailed market assessment has been performed
- 3 points: NPR including private properties
- 2 points: DPR concept options
- 1 point: IPR concept options

Table 4-5: Concept Option Scores for Public Acceptance

Concept Option ID	Score	Rationale
A1: NPR Palo Alto Phase 3	4	Demands recently refined during pre-design
A2: NPR Palo Alto Phase 3 Extended to Foothills	4	Phase 3 demands recently refined during pre-design. Additional area includes strong anchor
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	4	Phase 3 demands recently refined during pre-design. Additional area includes strong anchor
A4: NPR Mountain View	4	Demands from Mountain View RWFS
A5: NPR Mountain View Extended to Los Altos	3	Mountain View demands from RWFS. Demand in Los Altos includes a large private user.
A6: NPR East Palo Alto	3	Includes numerous private properties in East Palo Alto
B1: NPR Satellite Treatment Plant	4	Phase 3 demands recently refined during pre-design. Demand in Los Altos is non-potable for public properties only
C1: Palo Alto Dedicated IPR	1	IPR
C2: Palo Alto IPR and NPR	1	IPR
C3: Palo Alto IPR and NPR from Phase 3	1	IPR
D1: Palo Alto Dedicated DPR	2	DPR

4.4.3 Adaptability

Adaptability criterion assesses the potential to repurpose the proposed facilities in case of changes in the demand base. Concept options with the lowest risk of assets being stranded in the future scored highest. The concept options that included both NPR and IPR uses were considered most adaptable. Because the recycled water used for these concept options would be fully-advanced treated water suitable for groundwater injection, if NPR decreased, the water could be redirected to groundwater recharge. After the combined NPR and IPR concept options, the IPR-only concept option was considered the most adaptable given the ability to use the IPR treatment train within the DPR treatment train and repurpose the pipeline to the injection wells for conveyance of DPR water to the drinking water distribution system. IPR and DPR conveyance infrastructure could be repurposed to serve NPR customers if potable reuse for some reason became unacceptable to the community, but the injection wells and the advanced water purification facilities would be stranded assets. The NPR pipelines, which generally consist of smaller diameters than the IPR and DPR concept options, provide fewer repurposing opportunities than the IPR and DPR pipelines. Among the NPR concept options, those with larger diameter pipelines provide more opportunities for future uses.

Concept Options were scored as follows:

- 5 points: NPR/IPR
- 4 points: IPR only
- 3 points: DPR or NPR with backbone \geq 16-inch and non-extensive branching
- 2 points: NPR with backbone < 16-inch and non-extensive branching
- 1 point: NPR with extensive branching

Table 4-6: Concept Option Scores for Adaptability

Concept Option ID	Score	Rationale
A1: NPR Palo Alto Phase 3	2	NPR, pipeline backbone 12-inch
A2: NPR Palo Alto Phase 3 Extended to Foothills	1	NPR, extensive pipeline branches
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	1	NPR, extensive pipeline branches
A4: NPR Mountain View	2	NPR, pipeline ranges from 12- to 6-inch
A5: NPR Mountain View Extended to Los Altos	3	NPR, pipeline backbone 6-inch with several long branches following the 16-inch segment
A6: NPR East Palo Alto	2	NPR, pipeline backbone ranges from 12- to 10-inch with a few relatively short branches
B1: NPR Satellite Treatment Plant	1	NPR, pipeline branching begins at satellite facility
C1: Palo Alto Dedicated IPR	4	IPR only
C2: Palo Alto IPR and NPR	5	NPR with IPR
C3: Palo Alto IPR and NPR from Phase 3	5	NPR with IPR
D1: Palo Alto Dedicated DPR	3	DPR

4.4.4 Level of Agency Coordination

This criterion reflects the effort required by the lead agency to implement the concept option including design, use permitting, and operating requirements. Centralized NPR concept options were considered preferable to satellite NPR, IPR and DPR, all of which require new treatment processes to operate. DPR, which requires a new classification of treatment operators, was considered the least favorable concept option in this regard.

Concept Options were scored as follows:

- 5 points: Project previously evaluated and supported by community
- 4 points: NPR serving only lead agency or RWQCP partner owned sites or Project has already gone through public reviews
- 3 points: NPR serving various sites
- 2 points: NPR with satellite treatment or IPR
- 1 point: DPR

Table 4-7: Concept Option Scores for Level of Agency Coordination

Concept Option ID	Score	Rationale
A1: NPR Palo Alto Phase 3	4	Completed facilities plan and EIR
A2: NPR Palo Alto Phase 3 Extended to Foothills	3	NPR including non-partner sites in Palo Alto and Los Altos Hills
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	3	NPR including non-partner sites in Palo Alto, Los Altos, and Los Altos Hills
A4: NPR Mountain View	5	Mountain View prepared to implement project pending current update (July 2019) of RWFS
A5: NPR Mountain View Extended to Los Altos	3	NPR including non-partner sites in Los Altos
A6: NPR East Palo Alto	3	NPR including non-partner sites in East Palo Alto
B1: NPR Satellite Treatment Plant	2	New satellite treatment facilities
C1: Palo Alto Dedicated IPR	2	New treatment facilities for IPR
C2: Palo Alto IPR and NPR	2	New treatment facilities for IPR
C3: Palo Alto IPR and NPR from Phase 3	2	New treatment facilities for IPR
D1: Palo Alto Dedicated DPR	1	New treatment facilities for DPR

4.4.5 Level of Customer Retrofits/Coordination

Level of customer retrofits/coordination criterion is the effort and improvements required by the customer to use the recycled water. Having no retrofit requirements would be preferred, followed by changing meters for customers who already have a separate irrigation meter. Conversion of existing buildings is the least preferred due to anticipated complications with local public health approvals to verify there are no cross-connections within the retrofitted building. Concept Options were scored as follows:

- 5 points: No customer retrofits
- 4 points: Irrigation use only with separate meters
- 3 points: Irrigation use only, or indoor use limited to future development
- 2 points: Irrigation and indoor uses within existing buildings
- 1 point: Indoor uses only within existing buildings

Table 4-8: Concept Option Scores for Level of Customer Retrofits/Coordination

Concept Option ID	Score	Rationale
A1: NPR Palo Alto Phase 3	2	Includes indoor use for existing Palo Alto customers
A2: NPR Palo Alto Phase 3 Extended to Foothills	2	Includes indoor use for existing Palo Alto customers
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	2	Includes indoor use for existing Palo Alto customers
A4: NPR Mountain View	2	Includes indoor use for existing Mountain View customer
A5: NPR Mountain View Extended to Los Altos	2	Includes indoor use for existing Mountain View customer
A6: NPR East Palo Alto	3	Includes indoor uses limited to future developments in East Palo Alto
B1: NPR Satellite Treatment Plant	2	Includes indoor use for existing Palo Alto customers
C1: Palo Alto Dedicated IPR	5	IPR does not require customer retrofits
C2: Palo Alto IPR and NPR	3	NPR limited to irrigation
C3: Palo Alto IPR and NPR from Phase 3	3	Includes indoor use for existing Palo Alto customers
D1: Palo Alto Dedicated DPR	5	DPR does not require customer retrofits

4.4.6 Regulatory Complexity

Regulatory complexity criterion is a measure of the precedence of proposed uses of recycled water and permitting required for implementation. As a well-established practice, permitting for NPR will be more streamlined than potable reuse. Permitting for IPR which has established regulations will be less complex than DPR which does not yet have established regulations.

Concept Options were scored as follows:

- 5 points: NPR for irrigation only
- 4 points: NPR including non-irrigation uses
- 3 points: IPR only
- 2 points: NPR with IPR
- 1 point: DPR only

Table 4-9: Concept Option Scores for Regulatory Complexity

Concept Option ID	Score	Rationale
A1: NPR Palo Alto Phase 3	4	NPR including non-irrigation uses
A2: NPR Palo Alto Phase 3 Extended to Foothills	4	NPR including non-irrigation uses
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	4	NPR including non-irrigation uses
A4: NPR Mountain View	4	NPR including non-irrigation uses
A5: NPR Mountain View Extended to Los Altos	4	NPR including non-irrigation uses
A6: NPR East Palo Alto	4	NPR including non-irrigation uses
B1: NPR Satellite Treatment Plant	4	NPR including non-irrigation uses
C1: Palo Alto Dedicated IPR	3	IPR
C2: Palo Alto IPR and NPR	2	NPR with IPR
C3: Palo Alto IPR and NPR from Phase 3	2	NPR with IPR
D1: Palo Alto Dedicated DPR	1	DPR

4.4.7 Institutional Complexity

Institutional complexity criterion reflects the number of local agencies that would be involved in implementation and operation of the concept option. The more favorable concept options were those with fewer agencies involved since institutional complexity increases with the number of agencies involved. Concept Options were scored as follows:

- 5 points: One local agency
- 4 points: Two local agencies
- 3 points: Three local agencies
- 2 points: Four local agencies
- 1 point: Five local agencies

Table 4-10: Concept Option Scores for Institutional Complexity

Concept Option ID	Score	Rationale
A1: NPR Palo Alto Phase 3	5	1 agency: Palo Alto
A2: NPR Palo Alto Phase 3 Extended to Foothills	3	3 agencies: Palo Alto, Los Altos Hills, Purissima Hills Water District
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	1	5 agencies: Palo Alto, Los Altos, Los Altos Hills, Cal Water, Purissima Hills Water District
A4: NPR Mountain View	5	1 agency: Mountain View
A5: NPR Mountain View Extended to Los Altos	3	3 agencies: Mountain View, Los Altos, Cal Water
A6: NPR East Palo Alto ¹	3	3 agencies: Palo Alto, East Palo Alto Sanitary District, East Palo Alto
B1: NPR Satellite Treatment Plant	3	3 agencies: Palo Alto, Los Altos, Cal Water
C1: Palo Alto Dedicated IPR	5	1 agency: Palo Alto
C2: Palo Alto IPR and NPR	5	1 agency: Palo Alto
C3: Palo Alto IPR and NPR from Phase 3	5	1 agency: Palo Alto
D1: Palo Alto Dedicated DPR	5	1 agency: Palo Alto

Note: 1. Although the infrastructure for Concept Option A6 is sized for anticipated Menlo Park demands, the short-term project does not require coordination with Menlo Park.

4.4.8 Regional Perspective

Regional perspective criterion reflects the number of local agencies benefitting from the implementation of the concept option. In contrast to the institutional complexity criterion, the more favorable concept options were those that included multiple agencies. Concept Options were scored as follows:

- 5 points: Majority of RWQCP partners, multiple water retailers and multiple wholesalers benefit
- 4 points: Multiple water retailers and multiple wholesalers benefit
- 3 points: Multiple water retailers but only one wholesaler benefit
- 2 points: One water retailer but multiple wholesalers benefit
- 1 point: One water retailer and one wholesaler benefit

Table 4-11: Concept Option Scores for Regional Perspective

Concept Option ID	Score	Rationale
A1: NPR Palo Alto Phase 3	1	Partner Agency: Palo Alto; Retailers: Palo Alto; Wholesaler: San Francisco Public Utilities Commission
A2: NPR Palo Alto Phase 3 Extended to Foothills	3	Partner Agency: Palo Alto, Los Altos Hills Retailers: Palo Alto, Purissima Hills Water District Wholesaler: San Francisco Public Utilities Commission
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	4	Partner Agency: Palo Alto, Los Altos, Los Altos Hills Retailers: Palo Alto, Cal Water, Purissima Hills Water District Wholesaler: San Francisco Public Utilities Commission, Valley Water
A4: NPR Mountain View	1	Partner Agency: Mountain View Retailers: Mountain View Wholesaler: San Francisco Public Utilities Commission
A5: NPR Mountain View Extended to Los Altos	4	Partner Agency: Mountain View, Los Altos Retailers: Mountain View, Cal Water Wholesaler: San Francisco Public Utilities Commission, Valley Water
A6: NPR East Palo Alto ¹	3	Partner Agency: East Palo Alto Sanitary District, Palo Alto Retailers: East Palo Alto, Palo Alto Wholesaler: San Francisco Public Utilities Commission
B1: NPR Satellite Treatment Plant	4	Partner Agency: Palo Alto, Los Altos Retailers: Palo Alto, Cal Water Wholesaler: San Francisco Public Utilities Commission, Valley Water
C1: Palo Alto Dedicated IPR	1	Partner Agency: Palo Alto Retailers: Palo Alto Wholesaler: San Francisco Public Utilities Commission
C2: Palo Alto IPR and NPR	1	Partner Agency: Palo Alto Retailers: Palo Alto Wholesaler: San Francisco Public Utilities Commission
C3: Palo Alto IPR and NPR from Phase 3	1	Partner Agency: Palo Alto Retailers: Palo Alto Wholesaler: San Francisco Public Utilities Commission
D1: Palo Alto Dedicated DPR	1	Partner Agency: Palo Alto Retailers: Palo Alto Wholesaler: San Francisco Public Utilities Commission

Note: 1. Although the infrastructure for Concept Option A6 is sized for anticipated Menlo Park demands, the short-term project does not directly benefit Menlo Park

4.4.9 Social and Economic Benefit

Social and economic benefit criterion reflects the benefits of improved water supply reliability. Concept Options were scored as follows:

- 5 points: Supports a disadvantaged community
- 4 points: Supports community with projected shortfalls by 2020 in normal years
- 3 points: Supports community with projected shortfalls by 2020 in dry years
- 2 points: Supports community with projected shortfalls by 2040
- 1 point: No projected shortfalls

Table 4-12: Concept Option Scores for Social and Economic Benefit

Concept Option ID	Score	Rationale
A1: NPR Palo Alto Phase 3	1	No projected shortfalls
A2: NPR Palo Alto Phase 3 Extended to Foothills	1	No projected shortfalls
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	1	No projected shortfalls
A4: NPR Mountain View	2	Mountain View has projected shortfall by 2040
A5: NPR Mountain View Extended to Los Altos	2	Mountain View has projected shortfall by 2040
A6: NPR East Palo Alto	5	East Palo Alto is a disadvantaged community; East Palo Alto and Menlo Park have projected shortfalls
B1: NPR Satellite Treatment Plant	1	No projected shortfalls
C1: Palo Alto Dedicated IPR	1	No projected shortfalls
C2: Palo Alto IPR and NPR	1	No projected shortfalls
C3: Palo Alto IPR and NPR from Phase 3	1	No projected shortfalls
D1: Palo Alto Dedicated DPR	1	No projected shortfalls

4.4.10 Environmental Benefit

Environmental benefit criterion considers the improvement to the RWQCP's discharge to the San Francisco Bay. NPR diverts more contaminants from Bay discharge, and it is assumed that IPR and DPR will involve discharge of reverse osmosis concentrate with trace organics, nutrients, and trace metals. Concept Options were scored as follows:

- 5 points: NPR > 999 AFY
- 4 points: NPR 0 to 999 AFY
- 3 points: NPR with IPR
- 2 points: IPR only
- 1 point: DPR only

Table 4-13: Concept Option Scores for Environmental Benefit

Concept Option ID	Score	Rationale
A1: NPR Palo Alto Phase 3	4	NPR 800 AFY
A2: NPR Palo Alto Phase 3 Extended to Foothills	5	NPR 1,100 AFY
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	5	NPR 1,200 AFY
A4: NPR Mountain View	4	NPR 200 AFY
A5: NPR Mountain View Extended to Los Altos	4	NPR 900 AFY
A6: NPR East Palo Alto	4	NPR 500 AFY
B1: NPR Satellite Treatment Plant	5	NPR 900 AFY
C1: Palo Alto Dedicated IPR	2	IPR only
C2: Palo Alto IPR and NPR	3	NPR with IPR
C3: Palo Alto IPR and NPR from Phase 3	3	NPR with IPR
D1: Palo Alto Dedicated DPR	1	DPR only

4.5 Concept Option Scoring

4.5.1 Non-Cost Scoring

Palo Alto, Valley Water, and Mountain View, as the Strategic Plan primary stakeholders, weighted the non-cost criteria. Table 4-14 shows the average of the provided weights.

Table 4-15 presents the ranking of concept options based on the non-cost criteria alone. Considering only the non-cost criteria, the top scoring concept options are A2, NPR Palo Alto Phase 3 Extended to Foothills and the IPR concept options (Concept Options C1- C3) while the lowest scoring concept options are D1, Palo Alto Dedicated DPR and B1, NPR Satellite Treatment Plant. The previously recommended Palo Alto Phase 3 (Concept Option A1) and Mountain View long term project (Concept Option A4) rank in the middle.

Table 4-14: Non-Cost Criteria Weighting

Criteria	Percent of Non-Cost Score	Weighted Maximum Score per Criteria (Maximum score per Criteria being 5)
Amount of water supplied	19%	95
Public acceptance	17%	85
Adaptability	10%	50
Level of agency coordination	9%	45
Level of customer retrofits/coordination	5%	25
Regulatory complexity	6%	30
Institutional complexity	9%	45
Regional perspective	8%	40
Social and economic benefit	10%	50
Environmental benefit	7%	35
Total	100%	500

Table 4-15: Non-Cost Ranking

Rank	Score (Maximum Score = 500)	Concept Option
1	291	A2: NPR Palo Alto Phase 3 Extended to Foothills
2	290	C1: Palo Alto Dedicated IPR
3	289	C2: Palo Alto IPR with NPR
	289	C3: Palo Alto IPR and NPR from Phase 3 Pipeline
4	286	A5: NPR Mountain View Extended to Los Altos
5	285	A1: NPR Palo Alto Phase 3
	285	A4: NPR Mountain View
	285	A6: NPR East Palo Alto
6	282	A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos
7	271	B1: NPR Satellite Treatment Plant
8	269	D1: Palo Alto Dedicated DPR

The **IPR concept options** are scored well with non-cost criteria due to the large amount of water supplied combined with greater ability to repurpose the infrastructure and only one agency required to implement and operate.

Concept Option A2, NPR Palo Alto Phase 3 Extended to Foothills ranks highly because it delivers among the largest volumes of the NPR concept options and strikes a balance between offering regional benefits while requiring few agencies to implement and operate.

Concept Option D1, Palo Alto Dedicated DPR delivers the greatest volume of recycled water out of all the concept options, requires only one agency to implement and operate, and does not require infrastructure changes by customers. The notable drawback of Concept Option D1 is the implementation process. Given the lack of established regulations, pursuing a DPR project at this time would require more effort by Palo Alto to establish a process that DDW will permit. Even when DPR regulations are established, the hurdles that agencies must clear to permit DPR projects will likely be more challenging compared to other recycled water projects. Another challenge will be hiring/training staff to operate the new treatment facilities.

The presumed benefit of **Concept Option B1, NPR Satellite Treatment Plant** was the ability to create a compact recycled water distribution system rather than requiring an extensive network extending from the RWQCP. However, in this setting, the preferred location for diverting flows from the sewer system does not correspond to the areas of potential recycled water nor is there land available in the immediate vicinity of the diversion point to site a satellite treatment facility. As shown in Figure 3-8, Concept Option B1 involves a significant, branched pipe network.

4.5.2 Cost and Non-Cost Scoring

Table 4-16 presents the ranking of concept options by cost using the scoring listed herein. Factoring cost in at 30% of the score, concept options were scored as follows:

- 5 points: < \$3,500/AF
- 4 points: ≥ \$3,500/AF and < \$4,000/AF
- 3 points: ≥ \$4,000/AF and < \$4,500/AF
- 2 points: ≥ \$4,500/AF and < \$5,000/AF
- 1 point: ≥ \$5,000/AF

Factoring in cost at 30% of the total score was selected after testing for sensitivity to prevent cost from overtaking or from not having an impact on the total non-cost criteria scores. From the sensitivity analysis, weighting cost at 50% yielded similar results to weighting at 30%. Table 4-17 presents the combined weighting of the cost and non-cost criteria together. Table 4-18 presents the ranking of concept options combining the non-cost criteria and estimated costs.

Table 4-16: Ranking of Concept Options by Cost

Rank	Score	Concept Option
1	5	A1: NPR Palo Alto Phase 3
		A2: NPR Palo Alto Phase 3 Extended to Foothills
		A4: NPR Mountain View
		A6: NPR East Palo Alto
		C1: Palo Alto Dedicated IPR
		D1: Palo Alto Dedicated DPR
2	3	A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos
		C2: Palo Alto IPR with NPR
		C3: Palo Alto IPR and NPR from Phase 3 Pipeline
3	2	A5: NPR Mountain View Extended to Los Altos
4	1	B1: NPR Satellite Treatment Plant

Table 4-17: Combined Weighting Including both Cost and Non-Cost Criteria

Criteria	Percent of Non-Cost Score (Rounded)	Weighted Maximum Score per Criteria (Maximum score per Criteria being 5)
Amount of water supplied	13%	67
Public acceptance	12%	61
Adaptability	7%	35
Level of agency coordination	6%	30
Level of customer retrofits/coordination	4%	19
Regulatory complexity	4%	21
Institutional complexity	6%	30
Regional perspective	6%	28
Social and economic benefit	7%	36
Environmental benefit	5%	23
Cost	30%	150
Total	100%	500

Table 4-18: Combined Ranking Considering Cost at 30% of the Score

Rank	Score (Maximum Score = 500)	Concept Option
1	354	A2: NPR Palo Alto Phase 3 Extended to Foothills
	353	C1: Palo Alto Dedicated IPR
2	350	A1: NPR Palo Alto Phase 3
	350	A4: NPR Mountain View
	350	A6: NPR East Palo Alto
3	339	D1: Palo Alto Dedicated DPR
4	323	C2: Palo Alto IPR with NPR
5	317	A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos
6	293	C3: Palo Alto IPR and NPR from Phase 3 Pipeline
7	260	A5: NPR Mountain View Extended to Los Altos
8	220	B1: NPR Satellite Treatment Plant

Factoring in costs at 30% of the score, the top scoring concept options are NPR Palo Alto Phase 3 Extended to Foothills (**Concept Option A2**), Palo Alto Dedicated IPR (**Concept Option C1**), the previously recommended NPR Palo Alto Phase 3 (**Concept Option A1**) and Mountain View long-term project (**Concept Option A4**) and the NPR East Palo Alto concept option (**Concept Option A6**).

Concept Option D1, Palo Alto Dedicated DPR ranks in the middle. With the greatest amount of water supplied and one of the lowest estimated unit costs, Concept Option D1 scores well for the two most highly weighted evaluation criteria. The attractive cost helps to offset the DPR implementation challenges noted above.

Concept Option B1, NPR Satellite Treatment Plant remains solidly at the bottom. As discussed previously, Concept Option B1 requires a significant investment of infrastructure to convey flows from the sewer diversion point to treatment facilities and then to customers. The cost of conveyance infrastructure plus the cost of new treatment facilities including land acquisition are significant and, when factored into the scoring, further reduces the ranking of this concept option relative to the others.

Chapter 5 Conclusions and Next Steps

5.1 Conclusions

5.1.1 Summary of Demands and Engineer’s Opinion of Probable Costs

Table 5-1 provides a summary of potential demand by water reuse type considered in this Strategic Plan. The potential market for NPR demands includes the entire RWQCP service area, not one specific concept option. Table 5-2 summarizes the capital, O&M, and unit costs for the various concept options investigated in this Strategic Plan.

Table 5-1: Summary of Demand Potential by Type of Water Reuse

Type of Reuse	Annual Average Demand	Comments
NPR	4,456 AFY	Throughout RWQCP service area
IPR	2,800 / 5,900 AFY	For Palo Alto only
DPR	5,300 AFY	For Palo Alto only

Note: IPR annual average demand reflects volume recharged to the groundwater basin/ volume extracted from the groundwater basin

Table 5-2: Summary of Engineer’s Opinion of Probable Capital and O&M Costs

Concept Option	Capital Cost	O&M (\$/year)	Unit Cost (\$/AF)
A1: NPR Palo Alto Phase 3	\$47.8M	\$0.29M	\$3,400
A2: NPR Palo Alto Phase 3 Extended to Foothills	\$63.0M	\$0.52M	\$3,400
A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos	\$85.1M	\$0.68M	\$4,000
A4: NPR Mountain View	\$6.2M	\$0.1M	\$2,100
A5: NPR Mountain View Extended to Los Altos	\$72.6M	\$0.4M	\$4,600
A6: NPR East Palo Alto	\$20.7M	\$0.15M	\$2,400
B1: NPR Satellite Treatment Plant	\$129.6M	\$1.37M	\$8,900
C1: Palo Alto Dedicated IPR	\$92.2M	\$14.83M	\$3,300
C2: Palo Alto IPR with NPR	\$152.1M	\$16.92M	\$4,000
C3: Palo Alto IPR and NPR from Phase 3 Pipeline	\$198.4M	\$15.78M	\$4,400
D1: Palo Alto Dedicated DPR	\$104.6M	\$8.01M	\$2,500

Note: Costs based on an ENR CCI San Francisco index for June 2018 of 12,015. Costs are consistent with a Class 5 estimate (-20% to +50%) (AACE 2008). Capital costs are amortized at 3% over 30 years.

For comparison with other non-water reuse water supplies, potable water from SFPUC is projected to cost \$3,000 per AF in 2030, and groundwater, including wellhead treatment and the Valley Water groundwater pumping charge, is projected to cost \$3,000 per AF.²

To provide a basis for comparison, cost estimates reflect the incremental cost of pursuing each concept option. For the NPR options, the cost estimates include distribution to the end-user. Consistent with the incremental cost methodology, this report does not estimate the total cost of providing the IPR or DPR water to end-users as Palo Alto’s existing potable water distribution system costs are not included in the estimates.

² These are the estimated costs to the City of Palo Alto of purchasing SFPUC water or pumping groundwater and these cost estimates do not include distribution system costs.

5.1.2 General Conclusions Regarding NPR Concept Options

The Strategic Plan determined that there is interest throughout most of the RWQCP service area and neighboring communities in receiving recycled water from the RWQCP for NPR uses. The one Partner Agency that is not interested is Stanford University. Stanford University maintains a diverse water supply portfolio consisting of water from SFPUC, groundwater, local surface water, and captured stormwater. Stanford University does have significant non-potable water demands, but the university does not foresee a need for recycled water from the RWQCP due to the existence of its separate non-potable irrigation water system that meets over 30% of the campus' water demands (over 80% of irrigation demands). As such the NPR concept options evaluated under this Strategic Plan did not include service to Stanford.

The Strategic Plan considered NPR concept options with both centralized treatment at the RWQCP ("A" concept options) and a satellite treatment option ("B" concept option).

Of the centralized treatment options, Concept Option A2, NPR Palo Alto Phase 3 Extended to Foothills scored highest both with and without the cost criteria. The unit cost for Concept Option A2 is estimated to be similar to the cost of the previously recommended Concept Option A1, NPR Palo Alto Phase 3. Therefore, should Palo Alto elect to move forward with an NPR project, Concept Option A2 or variants, as shown in Appendix D, should be given additional consideration. An analysis of the cost implications of removing various branches of the base concept option will inform discussions regarding cost sharing between the relevant stakeholders in Palo Alto and Los Altos Hills as well as support rate analyses for Palo Alto and PHWD (the two retailers that would be involved in the concept option).

Concept Option A4, NPR Mountain View, was previously recommended in the 2014 Mountain View RWFS, due to its low cost and average non-cost score, was determined to be a reasonable investment compared to the other concept options explored in the Strategic Plan, and during the stakeholder evaluation process, Mountain View staff indicated their commitment to implementing this extension.

Concept Option A6, NPR East Palo Alto scored similarly to the Concept Options A1, NPR Palo Alto Phase 3 and A4, NPR Mountain View. Concept Option A6 is low cost, and the average non-cost score make it a reasonable investment compared to other concept options. Implementation will require coordination with EPASD, who is the Partner Agency that owns the wastewater flows from East Palo Alto to the RWQCP. Though implementation of the concept option does not require coordination with Menlo Park, if East Palo Alto chooses to move forward with the concept option, Menlo Park's level of interest should be verified prior to sizing the infrastructure. Appendix E presents variants of Concept Option A6 and the cost implications of including or not including Menlo Park's demands as well as the benefits of including Palo Alto's demands. This information can inform cost sharing discussion among the relevant stakeholders in Palo Alto, East Palo Alto, and Menlo Park and support a cost of service analysis for the City of East Palo Alto, the likely recycled water retailer.

NPR is challenging for Los Altos and Los Altos Hills because their customers are located furthest from the RWQCP and existing recycled water infrastructure and coordination with the Partner Agencies upstream would be needed. Between the two options to serve Los Altos – Concept Option A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos (which builds off of Concept Option A1) and Concept Option A5: NPR Mountain View Extended to Los Altos (which builds off of Concept Option A4) – Concept Option A3 is preferred due to preliminary costs. Between the two options to serve Los Altos Hills - Concept Option A2, NPR Palo Alto Phase 3 Extended to Foothills Concept Option A3: NPR Palo Alto Phase 3 Extended to Foothills and Los Altos – Concept Option A2 is higher ranked. To assist Los Altos and its retailer Cal Water, and to assist Los Altos Hills and its retailer Purissima Hills Water District, in evaluating an extension from the Palo Phase 3 Pipeline, Appendix E presents variants of Concept Options A2 and A3 that can inform cost sharing discussions among the relevant stakeholders and cost of service analyses for Cal Water and Purissima Hills Water District.

Satellite NPR

Concept Option B1, NPR Satellite Treatment Plant was included to bridge the gap between the source of recycled water at the RWQCP and customers at the periphery of the RWQCP's service area. However, the satellite option was found to be impractical for this setting given the mismatch between the ideal sewer diversion point and where demands are concentrated plus the limited availability of land and the cost of acquiring land to construct a new treatment facility in this area.

Treatment

Both distribution infrastructure and treatment facilities were considered for each of the NPR concept options. Palo Alto has committed to providing enhanced recycled water quality for NPR, meaning water delivered to non-potable customers would be a blend of advanced treated recycled water and disinfected tertiary recycled water to reduce TDS concentration to below 600 mg/L. Assuming implementation of the 2.25 MGD AWTS (which was recommended to provide a 1:1 blend of advanced and tertiary recycled water for the RWQCP's flow commitments of 3.0 MGD for Mountain View and 1.0 MGD for Palo Alto), each of the centralized NPR concept options presented in this Strategic Plan can independently be implemented without additional treatment facilities. The enhanced recycled water provided for these NPR concept options would have a TDS concentration below the 600 mg/L target threshold based on the RWQCP's average TDS concentration of approximately 900 mg/L and an anticipated advanced treated recycled water concentration of 50 mg/L.

Note that the three highest ranked NPR options (without overlap to other options) are A2, A4 and A6; together these options could all be implemented without triggering the need for reverse osmosis concentrate treatment but would require additional advanced or tertiary treatment facilities to produce enough enhanced recycled water, particularly to meet a 1:1 blend ratio.

The City has considered setting a more aggressive goal for the enhanced recycled water of maintaining TDS between 400 to 500 mg/L. Only the Mountain View concept option (Concept Option A4) would meet this goal during peak month demands without additional treatment facilities.

5.1.3 General Conclusions Regarding IPR Concept Options

Several of the RWQCP Partner Agencies and Strategic Plan stakeholders expressed interest in IPR. However, Palo Alto is the only agency that is actively investigating this option and that had groundwater data to support development of IPR concept options.

The IPR concept options that were considered in the Strategic Plan include a concept option dedicated to providing water to Palo Alto groundwater injection wells (Concept Option C1: Palo Alto Dedicated IPR), a concept option that captures non-potable uses in the vicinity of the pipeline needed to reach the Palo Alto groundwater injection wells (Concept Option C2: Palo Alto IPR with NPR), and a concept option that builds off of the Palo Alto Phase 3 Pipeline to convey water to the Palo Alto groundwater injection wells (Concept Option C3: Palo Alto IPR and NPR from Phase 3 Pipeline). Without considering cost, all three IPR concept options are among the top ranked concept options given the large amount of water they supply and lack of institutional complexity. With cost factored into the scoring, only Concept Option C1, Palo Alto Dedicated IPR remains a top scoring IPR concept option.

Implementation of an IPR project would require Palo Alto to incorporate groundwater into its water supply, and Palo Alto is assessing its desire to pursue groundwater use. In some other communities, IPR has generally been seen as a first step towards DPR, gaining customer acceptance of the concept of potable reuse before moving to DPR. However, Palo Alto does not currently use groundwater, and during preliminary study sessions, members of the Utilities Advisory Commission and City Council expressed a preference for DPR over IPR.

Given concerns regarding customer acceptance of groundwater quality compared to the existing SFPUC supply, Palo Alto is assumed to provide wellhead treatment at the groundwater extraction wells to lower

iron, manganese and TDS concentrations. Costs of this treatment were included in each IPR concept option and overall unit costs ranged from \$3,300 - \$4,400/AF for IPR concept options. For comparison, groundwater use with wellhead treatment and the Valley Water groundwater pumping charge but without any injection of recycled water, is projected to cost \$3,000 per AF (in 2018 dollars).

Treatment costs also include new full advanced treatment facilities, including reverse osmosis concentrate treatment, as needed, and associated land acquisition costs. Reverse osmosis concentrate treatment is estimated to be needed to ensure compliance with the RWQCP discharge permit for Concept Options C2 and C3 and thus included in the associated cost estimates.

5.1.4 General Conclusions Regarding DPR Concept Option

Because DPR regulations are not established, developing DPR concept options and drawing conclusions about the feasibility of DPR requires interpretation of the SWRCB's Proposed Framework for Regulating Direct Potable Reuse in California. The uncertainty in regulations is reflected in the low score that the Concept Option D1, Palo Alto Dedicated DPR received when considering only the non-cost criteria. However, when factoring in the estimated unit cost of Concept Option D1, which included extensive additional treatment facilities and engineered storage, the concept option rose to the middle of the rankings. Given the significant volume of existing potable supply that could be offset through Concept Option D1, its low estimated unit cost (\$2,500/AF), and the presumably greater acceptance of DPR over IPR in this setting, this concept option deserves further evaluation by Palo Alto and refinement as regulations emerge. For comparison, potable water from SFPUC is projected to cost approximately \$3,000 per AF in 2030.

5.2 Next Steps

Results of the Strategic Plan indicate that there are multiple water reuse expansion opportunities within the Study Area that agencies could pursue, including NPR, IPR, and DPR. The following are general next steps that should be considered for any of the concept options to move forward. Table 5-3 summarizes the recommended next steps by each category of water reuse.

Note that depending on the outcomes of the Countywide Plan, some of the Concept Options described in this Report may not be implementable due to limited supply of recycled water; further evaluation for joint implementation may be required as a next step.

Table 5-3: Recommended Next Steps for Type of Opportunity

	NPR – Next Steps	IPR- Next Steps	DPR – Next Steps
Facilities Planning	Prepare more detailed technical analysis to define facility requirements and to refine cost estimates to a Class 4 level of development (-10% to +30%).	Prepare more detailed technical analysis to define facility requirements and to refine cost estimates to a Class 4 level of development (-10% to +30%).	Prepare more detailed technical analysis to define facility requirements and to refine cost estimates to a Class 4 level of development (-10% to +30%). Prepare various treatment train options with cost estimates to reflect uncertainty to regulatory requirements for treatment.
Funding and Financing	Apply for funding and financing options; Appendix G contains a funding and financing matrix describing a variety of options for recycled water projects. At present, these programs apply to all types of water reuse. Develop recycled water rates to be applied to recycled water customers.	Apply for funding and financing options; Appendix G contains a funding and financing matrix describing a variety of options for recycled water projects. At present, these programs apply to all types of water reuse.	Apply for funding and financing options; Appendix G contains a funding and financing matrix describing a variety of options for recycled water projects. At present, these programs apply to all types of water reuse.
Inter-agency Agreements	If the NPR project involves more than one of the RWQCP Partners, an inter-agency agreement would be needed. New agreements could be modeled after the existing agreement between Palo Alto and Mountain View for the Phase 2 system.	With Valley Water’s role as Groundwater Sustainability Agency, an agreement between Palo Alto and Valley Water is needed for an IPR project.	For a DPR project serving Palo Alto only (as described in Concept Option D1), no specific inter-agency agreements are identified at this time.
Environmental Documentation	NPR concept options could be covered under a new environmental document or possibly an amendment to the Phase 3 Environmental Impact Report, depending on the concept option. Either document should meet the requirements of CEQA, and pending selected funding and financing options, the requirements of CEQA-Plus or NEPA.	A new environmental document covering the IPR project would be needed. This document should meet the requirements of CEQA; and, pending selected funding and financing options, the requirements of CEQA-Plus or NEPA.	A new environmental document covering the DPR project would be needed. This document should meet the requirements of CEQA; and, pending selected funding and financing options, the requirements of CEQA-Plus or NEPA.
Reuse Permitting	Covered under Statewide General Order for Recycled Water Use (WQ-2014-009).	Covered under SWRCB regulations, adopted by the State in 2014.	There are no established regulations for DPR projects and no proposed timeline for the State to develop DPR regulations for treated drinking water augmentation.
Customer and Public Outreach	Outreach to specific customers to be served by the NPR project to confirm delivery location, confirm demand, discuss site retrofits, etc. For NPR projects delivering to areas that do not have a mandatory use ordinance in place, customer outreach to encourage customers to sign on to the NPR project.	Public outreach to inform Palo Alto customers of changes to source water (i.e. blending in groundwater to the existing SFPUC supplies) should be considered.	Public outreach to inform Palo Alto customers of changes to source water (i.e. blending in of DPR water to the existing SFPUC supplies) should be considered.

References

- Anderson, Daren (Division Manager at the City of Palo Alto Open Space and Parks Department). Email to Emmalynne Roy providing details on habitat enhancement water use at Foothill Park's Boronda Lake. 2018.
- Association of the Advancement of Cost Engineering International (AACE), 2008. International Recommended Practice No. 56R-08:Cost Estimate Classification System – As Applied for the Building and General Construction Industries.
- Brown and Caldwell, 1992. Water Reclamation Master Plan for the Regional Water Quality Control Plant. April, 1992.
- California Building Standards Commission, 2011. 2011 CalGreen Green Building Requirements. January, 2011.
- Carollo, 2014. City of Mountain View Recycled Water Feasibility Study. March, 2014.
- Engelage, Samantha (Senior Engineer at City of Palo Alto Recycled Water Program). Email to Emmalynne Roy providing details on habitat enhancement water use at Byxbee Park. 2018.
- City of Mountain View, 2017. Ordinance No. 17.16. Available:
<https://www.mountainview.gov/civicax/filebank/blobdload.aspx?BlobID=21813>
- City of Palo Alto. 2017. *Clean Bay 2017 Pollution Prevention Plan*. Available:
<https://www.cityofpaloalto.org/civicax/filebank/documents/56148>
- City of Palo Alto, 2008. Ordinance No. 5002. Available:
<https://www.cityofpaloalto.org/civicax/filebank/documents/19503>
- City of Palo Alto Utilities, 2017. 2017 Water Integrated Resources Plan. January, 2017.
- City of Palo Alto Utilities, 2016. City of Palo Alto 2015 Urban Water Management Plan. June, 2016.
- MNS, 2017. Advanced Water Purification System Preliminary/Conceptual Design Report. December, 2017.
- State Water Resources Control Board (SWRCB), 2018. A Proposed Framework for Regulating Direct Potable Reuse in California. April, 2018.
- SWRCB, 2016. Investigation on the Feasibility of Developing Uniform Water Recycling Criteria for Direct Potable Reuse. December, 2016.
- Todd Groundwater, 2018. Groundwater Assessment, and Indirect Potable Reuse Feasibility Evaluation and Implementation Strategy Report. November, 2018.
- Unites States Green Building Council, 2014. LEED Reference for Building Operations and Maintenance, Version 4. October, 2014.
- Unites States Green Building Council, 2012. LEED 2009 Water Use Reduction Additional Guidance (Version 7). July, 2012.
- West Yost Associates, 2017. City of Menlo Park Water Supply Master Plan, Draft. November, 2017.
- Woodard & Curran, 2018. Preliminary Design for Phase 3 Recycled Water Distribution System Final Report. February, 2018.

This Page Intentionally Left Blank



Santa Clara Valley Water District

File No.: 19-0819

Agenda Date: 9/5/2019

Item No.: 4.2.

COMMITTEE AGENDA MEMORANDUM

Joint RWPC with Cities of Palo Alto/E. Palo Alto/Mtn View

SUBJECT:

Update on Countywide Water Reuse Master Plan and Reverse Osmosis Concentrate Management Plan.

RECOMMENDATION:

Receive information and discuss next steps.

SUMMARY:

On September 26, 2018, staff provided the Joint Recycled Water Policy Committee (Committee) with an update of the Santa Clara Valley Water District's (Valley Water) Countywide Water Reuse Master Plan (Reuse Master Plan). The goal of the Reuse Master Plan is to improve water supply reliability, through water reuse, in collaboration with recycle water producers, wholesalers, retailers, users, and other interested parties. During the September 26, 2018 meeting staff discussed Reuse Master Plan objectives, roles and responsibilities, baseline development, regional integration and stakeholder engagement opportunities. This item will provide an update on the Reuse Master Plan, which now incorporates improvements adopted by Valley Water's Board of Directors on June 11, 2019.

Current efforts of the Reuse Master Plan are focused on developing and evaluating the viability of the three recommended project portfolios based on preliminary one percent level of design (1% design). Important considerations as staff continues the planning process include:

- The portfolios include independent project elements that may be mixed/matched for planning purposes;
- The portfolios will be developed for maximum project flexibility;
- The Reuse Master Plan will involve an assessment of treated water augmentation (TWA) requirements and opportunities; and
- The revised schedule allows for increased stakeholder review time and added more collaboration opportunities.

The revised scope of the consultant agreement involves developing recommended alignments and infrastructure for each project element (i.e. pre-engineering (1% design) depicting facility locations and/or pipeline alignments) that are intended to facilitate discussion, collaboration and confirmation before preparing preliminary 10% project designs (10% design). These 10% designs will document existing conditions and develop engineering/technical information to allow objective assessments of the advantages and limitations of each project alternative. An economic assessment of the 10% designs will be undertaken to consider the cost of the water supply source, capital investments, and operations and maintenance costs (including 30- and 100-year lifecycle replacement costs) of the

associated infrastructure.

On August 13, 2019, the Project Partner Group (PPG) convened to review 1% designs and provide feedback to Valley Water before the planning process continues forward with 10% design. Staff will provide the Committee the results of these PPG discussions, as well as other major comments received regarding preliminary 1% designs of portfolio project elements. Staff will also provide an update of our Reverse Osmosis Concentrate (ROC) Management Program, a critical component of the Reuse Master Plan to properly manage the concentrated salt stream formed when producing advanced purified water for potable reuse.

NEXT STEPS:

Staff will revise the preliminary 1% designs based on comments from stakeholders, including the PPG before initiating further engineering and technical analysis. Staff will then proceed with the preparation of 10% project designs and an American Association of Cost Engineering (AACE) Class V cost analysis for completion by late September 2019. The 10% designs will include corresponding ROC management solutions (including 10% design and AACE Class V cost estimates) for each portfolio currently under development. Staff is also planning follow-up stakeholder meetings for October to discuss these 10% designs and ancillary cost analyses before beginning preparation of the Draft Reuse Master Plan Report.

ATTACHMENTS:

Attachment 1: PowerPoint

UNCLASSIFIED MANAGER:

Jerry De La Piedra, 408-630-2257



Valley Water

Clean Water • Healthy Environment • Flood Protection

Update on
Countywide Water Reuse Master Plan
and
Reverse Osmosis Concentrate Management Plan

Agenda

Countywide Water Reuse Master Plan (CWRMP)

- Milestones
- Timeline
- Stakeholder Meetings

Project Partnership Group (PPG) Meeting

Reverse Osmosis Concentrate Management Plan (ROCMP)

- 10% Design
- Grant

CWRMP Update

Milestones

- Maximum Flexibilities
- Treated Water Augmentation
- Grant Preparation
- Additional Stakeholder Review

Timeline

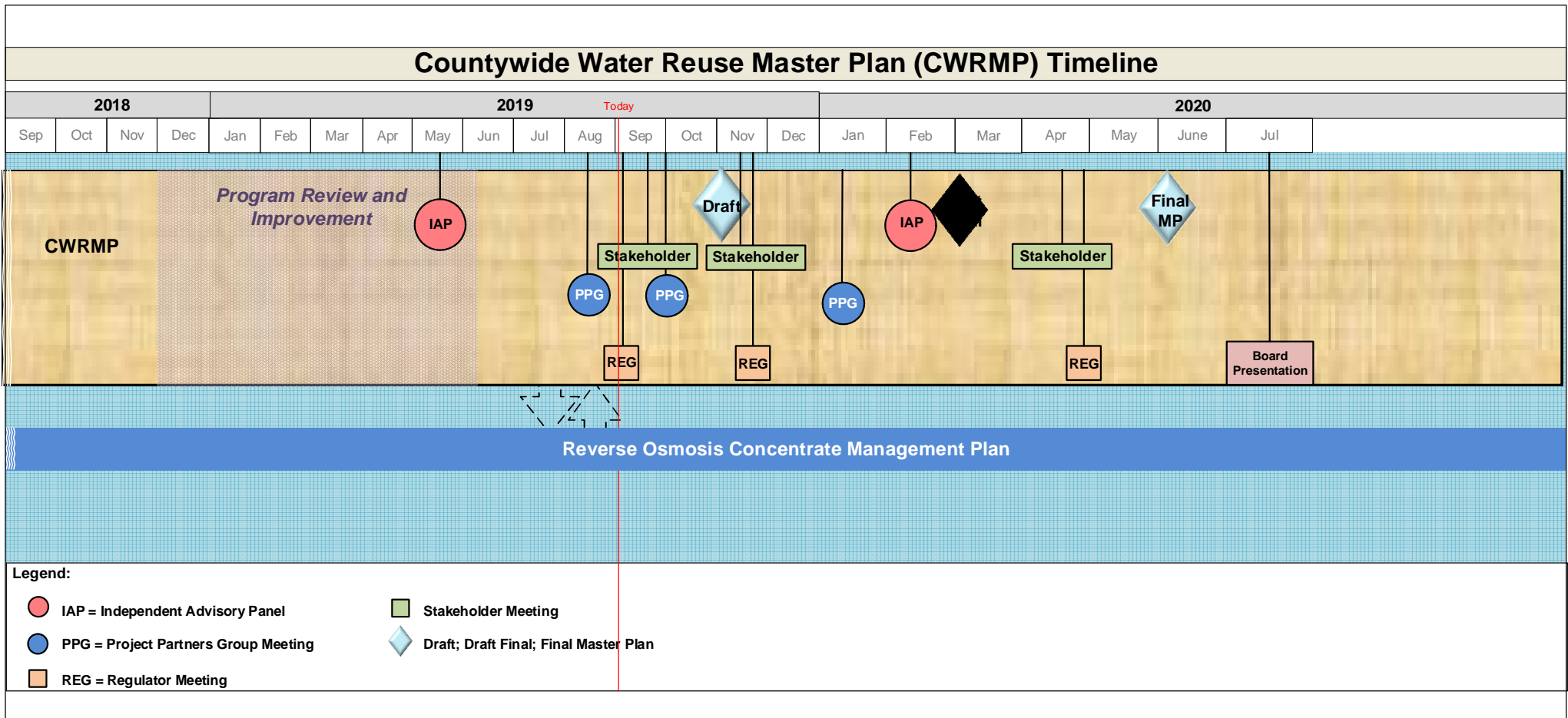
- Draft Master Plan (December 2019)

Stakeholder Meetings

- Regulatory Meetings



Project Schedule through Completion



PPG Meeting #5

Meeting Guidelines

- Purpose and Guidelines
- Current Status and Assumptions
- Reuse Opportunities and Treatment

Comparison of Portfolios

- Conceptual and 1% Design
- Facility Sizes, Locations & Alignments

Stakeholder Feedback

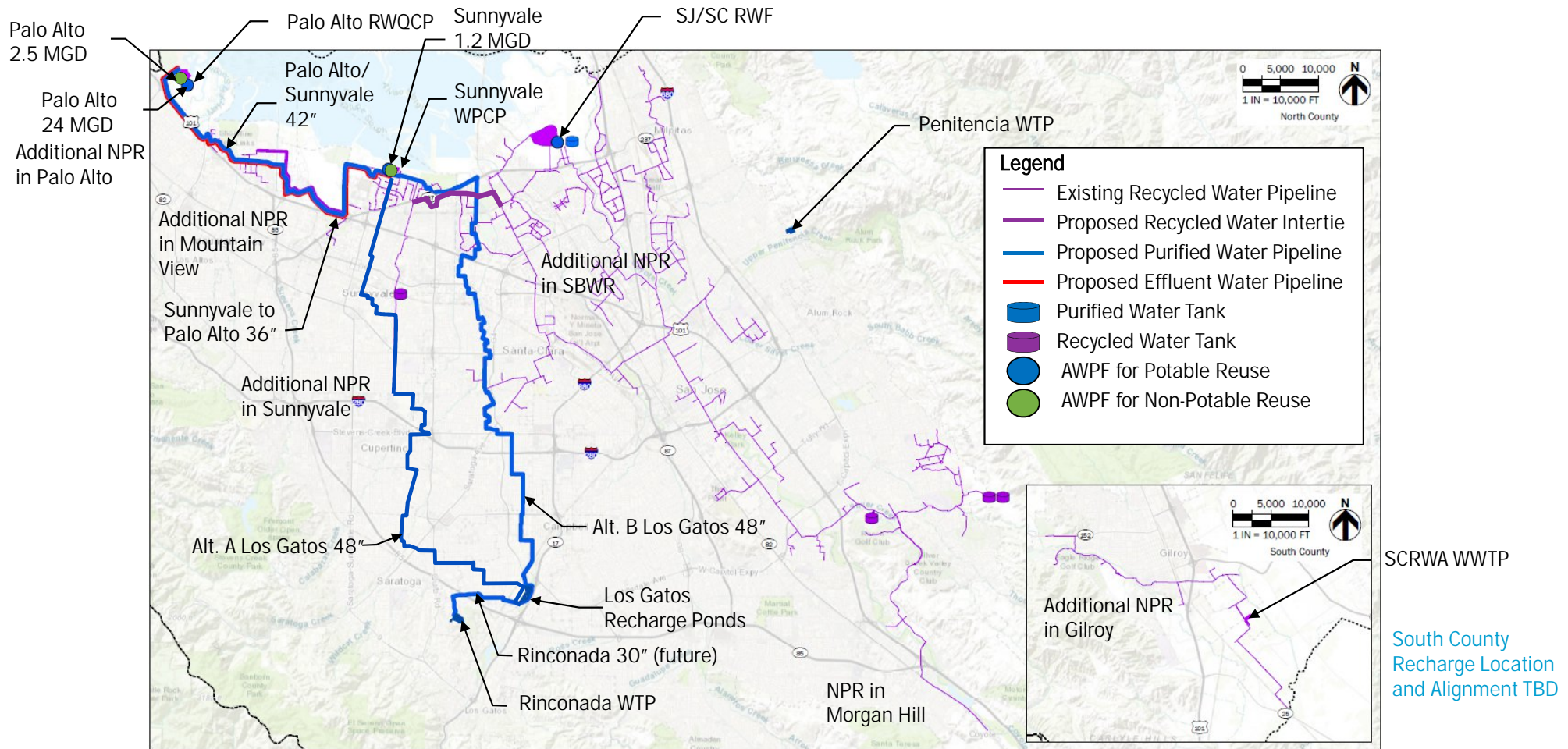


Comparison of Portfolios

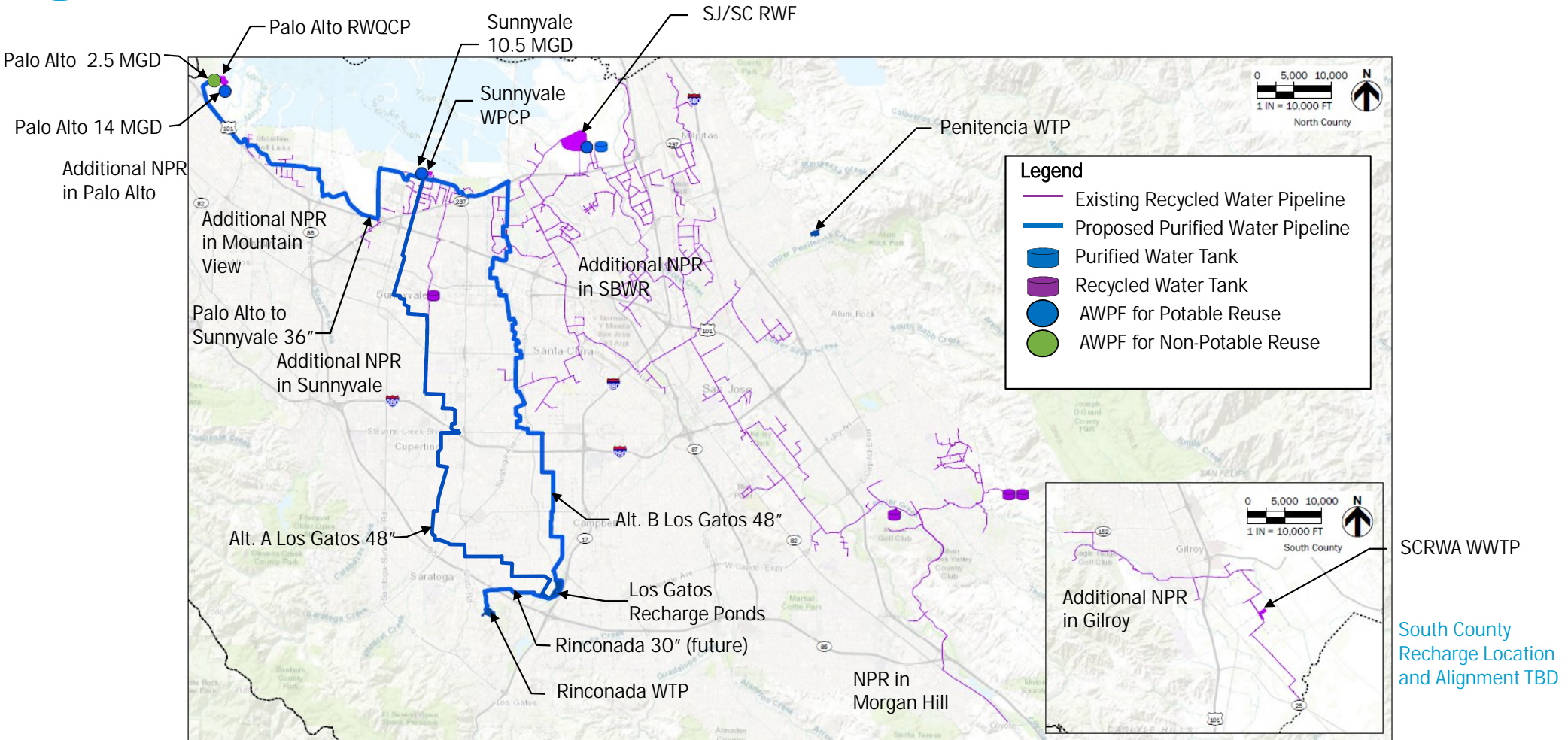
- Develop 24,000 AFY of potable reuse by 2028.
- Expand countywide reuse using source water from Project Partners.
- Maximizing flexibility by leveraging current infrastructure with new projects.
- Reflect a mix of non-potable (NPR) and potable reuse (PR).

2a

Facility Sizes, Locations, and Alignments



Facility Sizes, Locations, and Alignments



Stakeholder Comments

Time for Technical Review

Cost Consciousness

Integration with Water Supply

Public Perception

RWA (Raw Water Augmentation)

TWA (Treated Water Augmentation)

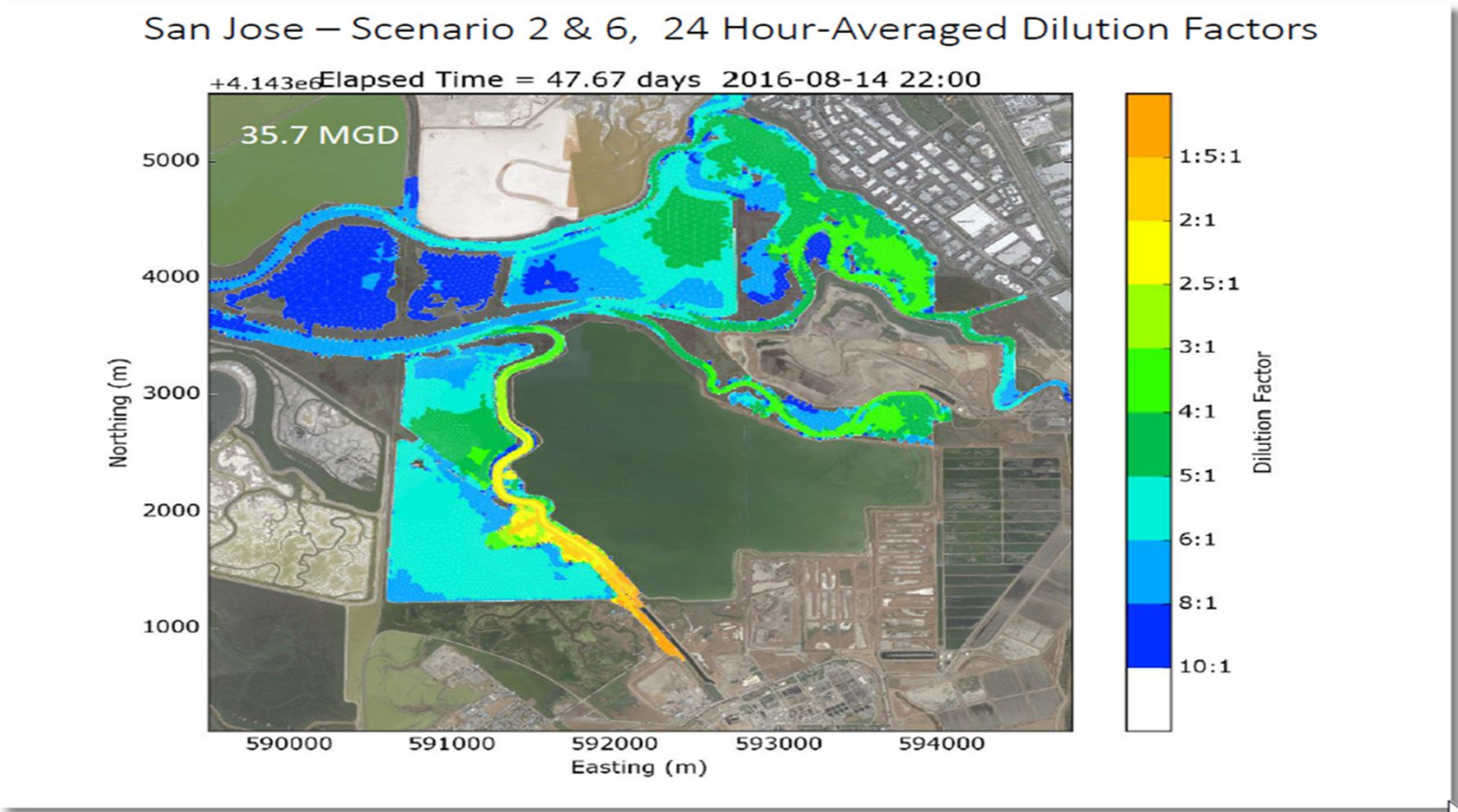


ROCMP Update

Engineered Treatment Cells Pilot Study – partnership with Stanford, San Francisco Estuary Institute (SFEI), and UC Berkeley (UCB)

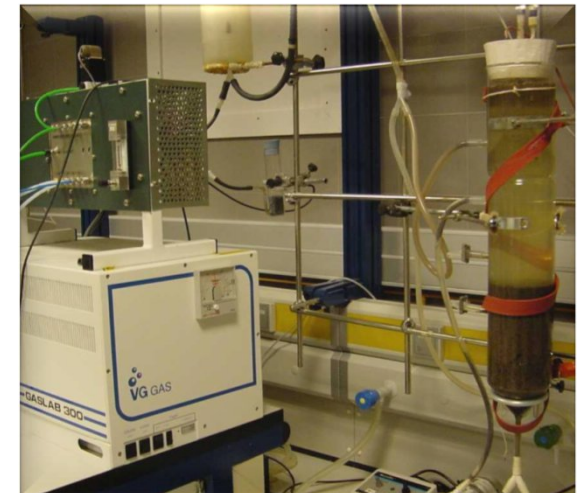
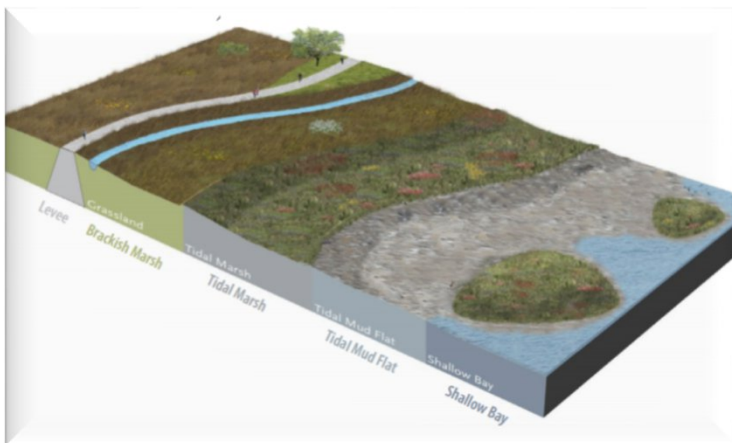


Hydrodynamic Modeling of South Bay



Additional Studies and Pilot Testing

- Physio-chemical treatments
 - Electrocoagulation
 - Capacitive Coagulation
- Green/Natural treatments
 - Vegetated floating wetlands
 - ROC transport to Oro Loma (Horizontal Levee Project)



Next Steps

- Basis of Design and site-specific ROCMP options
- 10% cost analysis
- Alignment with Countywide Water Reuse Master Plan



This Page Intentionally Left Blank



Santa Clara Valley Water District

File No.: 19-0820

Agenda Date: 9/5/2019

Item No.: 4.3.

COMMITTEE AGENDA MEMORANDUM

Joint RWPC with Cities of Palo Alto/E. Palo Alto/Mtn View

SUBJECT:

Update on Partnership to Expand Water Reuse.

RECOMMENDATION:

Receive information and discuss next steps regarding the development of a proposed partnership to expand water reuse.

SUMMARY:

A reliable supply of clean water is necessary for the environmental, economic, and social well-being of Santa Clara County. On behalf of the community, the Santa Clara Valley Water District (Valley Water), along with local partners such as the cities of Palo Alto and Mountain View, have made significant investments to manage demands for water as well as to develop water supplies and infrastructure to meet the county's water needs. As demands continue to grow, and future supplies become more uncertain due to climate change, it's important we continue to expand these partnerships to develop locally controlled, drought-resilient supplies such as water reuse.

Valley Water is currently in the process of updating its Water Supply Master Plan (Master Plan), which recommends investment decisions to meet the county's 2040 water supply reliability goals in a cost-effective manner. One of the key strategies of the Master Plan is to expand water conservation and water reuse. These types of programs offer multiple benefits, including being locally controlled and drought-resilient, and are generally well-supported by the community. They also offer various environmental benefits, such as:

- Reduce county-wide reliance on imported water;
- Reduce water that must be taken from the Tuolumne River;
- Reduce Regional Water Quality Control Plant flow and pollutant loading discharged to the San Francisco Bay.

The Master Plan has identified a goal of developing 24,000 acre-feet per year of potable reuse capacity by 2028. In addition, Valley Water has established a goal that 10 percent of total countywide demands be met from water reuse by 2025. To assist in meeting these goals, Valley Water has been in discussions with the cities of Palo Alto and Mountain View on a partnership. These discussions have focused on the development of a local plant/program (owned and operated by Palo Alto) to provide a higher quality of recycled water, primarily for irrigation and cooling towers, and a regional plant/program (owned and operated by Valley Water) to provide advanced purified water for potable reuse.

Discussions have been ongoing for over a year, and although they are not complete, staff is providing the Committee an update on the discussions' current status. A draft term sheet for the proposed partnership is provided (Attachment 1), along with a draft schedule (Attachment 2) for approval by all agencies. It should be noted that although significant progress has been made over the last year or so, not all terms have been agreed upon by staff. The goal is to complete these discussions by October 2019 for City Council and Valley Water Board consideration in November/December 2019. Staff from Palo Alto and Valley Water are also in the process of reaching out to the other agencies that send wastewater to the Palo Alto Regional Water Quality Control Plant to discuss key terms in the proposed agreement that apply to them and to determine their level of interest in this agreement.

ATTACHMENTS:

- Attachment 1: Draft Partnership Term Sheet to Expand Water Reuse
- Attachment 2: Draft Agreement Schedule
- Attachment 3: Presentation

UNCLASSIFIED MANAGER:

Jerry De La Piedra, 408-630-2257

PARTNERSHIP BETWEEN PALO ALTO, MOUNTAIN VIEW, AND THE SANTA CLARA VALLEY WATER DISTRICT TO ADVANCE RESILIENT WATER REUSE PROGRAMS IN SANTA CLARA COUNTY

WORKING DRAFT – All Terms Still Under Discussion

- A. WHEREAS, the governing bodies of the Santa Clara Valley Water District (Valley Water) and the Cities of Palo Alto and Mountain View (collectively, the Parties) have established policy goals for long term sustainability, which include maintaining effective use of existing infrastructure, lowering the carbon footprint of energy use, deploying water use efficiency programs, capturing local storm water, managing groundwater basins, and expanding use of recycled water; and
- B. WHEREAS, the Parties have long-standing responsibilities and services to supply water to their customers in Santa Clara County (County) under both normal and drought conditions; and
- C. WHEREAS, the Parties seek to develop locally reliable water supply sources to offset supplies of water that would otherwise have to be imported via the Sacramento-San Joaquin River Delta and its tributaries, including the Tuolumne River and other mountain streams; and
- D. WHEREAS, the Parties together are finalizing the Northwest County Recycled Water Strategic Plan to inform their respective policy makers of opportunities in the north-west portion of Santa Clara County, including Palo Alto and Mountain View, for groundwater recharge, further recycled water development, and deployment of highly purified wastewater to supplement drinking water; and
- E. WHEREAS, increasing the use of Recycled Water decreases contaminants discharged to San Francisco Bay where harm to wildlife can occur; and
- F. WHEREAS, Valley Water has established a goal that at least 10 percent of total County water demands be supplied by recycled water by 2025; and
- G. WHEREAS, decreasing the salinity of the treated wastewater from the Palo Alto Regional Water Quality Control Plant (RWQCP) through further treatment will allow it to be used on more types of flora, especially redwood trees, thereby increasing its overall use, and further reducing the need to import water from mountain streams including the Tuolumne River; and
- H. WHEREAS, decreasing the salinity in Recycled Water used for irrigation keeps that salt out of the soil and ultimately out of the ground water; and
- I. WHEREAS, the Parties recognize that well-purposed and managed partnerships can serve the public interest more effectively than their individual efforts to develop and manage water supplies; and

J. WHEREAS, the Parties desire to cooperate to achieve the most cost effective, environmentally beneficial utilization of treated wastewater in the County.

DEFINITIONS

Agreement: This Agreement between the Santa Clara Valley Water District, Palo Alto, and Mountain View.

Designated Representatives: Employees or officials designated in writing by each of the respective Parties to serve as representatives for purposes of this Agreement. In the absence of such written notice, the Designated Representatives shall be the Valley Water Chief Executive Officer, the Mountain View City Manager, and the Palo Alto City Manager.

Dispute Resolution Procedure: The alternative dispute resolution process to be used for disputes arising out of this Agreement. The procedure is set forth in more detail in Article 26 below.

Effluent: Tertiary treated wastewater from the RWQCP.

Enhanced Recycled Water: Non-potable water produced by the Local Plant which is blended with Recycled Water from the RWQCP.

Local Plant: A salinity removal unit to produce 1.25 MGD Enhanced Recycled Water for the RWQCP service area, for initial use within Palo Alto and Mountain View service areas.

MGD: million gallons per day.

Minimum Flow Delivery: the minimum amount of Effluent to be supplied by the RWQCP to Valley Water, consistent with Appendix 1.

Effluent Transfer Option: Valley Water's option to secure Effluent, as described in Article 13 of this Agreement.

Parties: The City of Palo Alto ("Palo Alto"), the City of Mountain View ("Mountain View"), and the Santa Clara Valley Water District ("Valley Water").

Recycled Water: Effluent that is treated to meet Title 22 regulations for non-potable water.

Regional Plant: A purification treatment facility capable of treating Effluent flows of 9 MGD or greater for the purpose of regional water supply benefit.

Regional Program: Valley Water's program to derive benefits from the Effluent under the terms of this Agreement.

Responsible Agencies: Responsible Agencies are agencies other than the lead agency, that have some discretionary authority for carrying out or approving a project, as defined in the California Environmental Quality Act and its associated regulations.

RWQCP: The Palo Alto Regional Water Quality Control Plant.

RWQCP Partners: The cities of Palo Alto, Mountain View and Los Altos; the Town of Los Altos Hills; the East Palo Alto Sanitary District; and Stanford University.

RWQCP Partner Agreements: Agreements between Palo Alto and one or more of the RWQCP Partners regarding provision of Effluent to Valley Water for its Regional Program.

RWQCP Service Area: RWQCP Service Area includes the cities of Palo Alto, Mountain View, and Los Altos; the service area of the East Palo Alto Sanitary District; the Town of Los Altos; and Stanford University.

Startup: The point in time when Valley Water begins to receive regular Effluent flows. If at the Regional Plant, Startup will occur following initial testing and commissioning. Startup can alternatively mean the point in time when Valley Water begins to pay for the Effluent as part of its Regional Program, pursuant to this Agreement.

SECTION A - General Provisions

1. Term.

This Agreement shall be in effect upon execution by the Parties. The Term of the Agreement shall be 43 years from date of execution; however, if Valley Water exercises its Effluent Transfer Option as described in Section C, the Term of this Agreement shall be extended to 63 years from Startup.

2. Termination.

This Agreement may be terminated by the Parties as follows:

- a. Termination by Valley Water. At any time after Valley Water has exercised its Effluent Transfer Option as set forth in Section C, it may terminate this Agreement at its sole discretion by providing Palo Alto and Mountain View with at least five years' written notice if Valley Water has commenced receiving Effluent or at least two years' written notice if Valley Water has not commenced receiving Effluent. Its Annual Payment for Effluent shall be prorated based upon the proportion of the fiscal year it continues to receive Effluent through the designated termination date.
- b. Termination by Palo Alto or Mountain View. [Proposed language to be provided – to include force majeure occurrences such as if compliance with the Agreement would result in a violation of state/federal law or regulatory permits; also to include if Valley Water does not utilize the Effluent within X years.]

3. Governance.

A joint committee comprised of elected officials from Valley Water, Palo Alto and Mountain View will be established to review and accept updates on the design, construction, operation and regulatory compliance of the Local Plant and the Regional Plant if the Regional Plant is located in Palo Alto. If the Regional Plant is not located in Palo Alto then the aforementioned committee will operate only with respect to the Local Plant. The committee's role will be advisory to staff and governing bodies of the Parties.

SECTION B - Local Plant

4. Local Plant Beneficiaries

The Parties agree that the Local Plant will be developed by Palo Alto and operated for the benefit of recycled water customers of Palo Alto, Mountain View, and potentially other RWQCP Partners. Palo Alto and Mountain View shall ensure that the recycled water production arising from the Local Plant shall be applied or utilized in Santa Clara County in proportion to the amount of capital contributed by Valley Water to the Local Plant. The Parties intend that recycled water customers of the RWQCP Partners will benefit from the lowered salinity of recycled water blended with treated water from the Local Plant. The Parties intend that, once a Local Plant has been brought into operation, redwood trees and other plantings may be safely irrigated with recycled water sourced from the RWQCP.

5. Local Plant Ownership, Operation and Maintenance, and Location

The Parties agree that Palo Alto shall own the Local Plant and be responsible for its design, construction, operation, maintenance, ultimate decommissioning, and site restoration. The Local Plant shall be located within the RWQCP site.

6. Local Plant Capital Costs

- a. Valley Water's Contribution: The total project capital cost is estimated to be \$20 Million. Valley Water's contribution shall be \$16 Million (2019 dollars), escalated annually based on Valley Water's Yield-to-Maturity Rate as published in Valley Water's Quarterly Performance Reports to the Board of Directors for the fourth quarter of each fiscal year. Monthly, Palo Alto shall invoice Valley Water for capital project costs expended including documentation of work performed. Invoices shall not include Parties' own staff costs and administrative overhead. Valley Water shall pay such valid invoices within thirty days of receiving them. Valley Water's \$16 Million (2019 dollars) contribution towards the Local Plant in conjunction with the Annual Option Payments set forth in Article 7 shall constitute full and final consideration for its right to secure the Minimum Flow Delivery.
- b. Palo Alto's and Mountain View's combined contribution shall be the difference between the actual project cost and Valley Water's contribution. Upon completion of the Local Plant, if the expended capital project cost is less than \$16 Million, Palo Alto shall invoice Valley Water for the difference of the \$16 Million and the actual capital project cost, excluding Parties' own staff costs and administrative overhead, of the Local Plant. Any of the \$16 Million that is not utilized for the Local Plant shall be utilized for Recycled Water projects within the cities of Palo Alto or Mountain View, or both. The benefits of any grant funding for the Local Plant shall be split by Palo Alto and Mountain View as determined by a separate agreement between Palo Alto and Mountain View. The grant funding sought by Palo Alto or Mountain View or both shall not include the San Jose Area Water Reclamation and Reuse Program under the Title XVI Program.

- c. Should the construction low bid, or any unforeseen circumstance, drive the total project cost above the \$20 Million estimate, Palo Alto and/or Mountain View may elect to cover the increase (above Valley Water's \$16 Million contribution) themselves, without an additional contribution from Valley Water. If Palo Alto and/or Mountain View are unable to identify a funding source to cover costs above the \$20 Million total project cost estimate, Palo Alto and/or Mountain View may request a meet and confer with Valley Water to potentially modify this Agreement. However, absent such a modification to the Agreement, Valley Water's contribution shall be limited to \$16 Million (2019 dollars).
- d. If Palo Alto and Mountain View elect not to proceed with construction of the Local Plant because (a) the low bid was above \$20 Million, and (b) they are unable to identify an alternate source for the amount above \$20 Million, then they shall provide written notice to Valley Water and may still receive the \$16 Million (2019 dollars) contribution from Valley Water so long as such funds are utilized exclusively for Recycled Water projects within the cities of Palo Alto or Mountain View or both within X years of execution of this Agreement (**Valley Water's proposed language. Palo Alto and Mountain View disagree with the time limit associated with the funds**). Valley Water shall be invoiced for capital project costs expended including documentation of work performed. Invoices shall not include Parties' own staff costs and administrative overhead. Valley Water shall pay such valid invoices within thirty days of receiving them.

7. Annual Option Payments Prior to Startup of Regional Plant

- a. Amount of Payment. Valley Water agrees to pay to Palo Alto \$200,000 per year (2019 dollars) ("Annual Option Payment") from the date of execution of this Agreement by the Parties, to culminate (a) at the thirteen-year calendar milestone of execution of this Agreement by the Parties, or (b) at Startup, whichever occurs first. The amount of the Annual Option Payment (which in 2019 dollars is \$200,000) shall be increased annually based on the annual average (previous twelve months) of the CPI-All Items for the San Francisco-Oakland-Hayward, California area published by the United States Department of Labor-Bureau of Labor Statistics (<https://data.bls.gov/PDQWeb/cu>), beginning on the first anniversary of the execution of this Agreement.
- b. Timing of Payment. Valley Water shall provide the Annual Option Payment to Palo Alto by June 1 of each year beginning June 1, 2020.
- c. Allocation of Payment. (1) Fifty percent (50%) of the Annual Option Payment will be allocated to Palo Alto and Mountain View for their use, at their discretion, for water supply related projects within their jurisdictions. (2) Palo Alto will distribute the remaining 50% of the Annual Option Payment to the RWQCP Partners (other than Palo Alto and Mountain View) that have committed their Effluent by January 31 of the year that the Annual Option Payment is made so long as such funds are used for water supply projects within the RWQCP Partners' respective jurisdictions. Palo Alto shall ensure that RWQCP Partners use of these funds

complies with the restrictions in this subparagraph (c). If no other RWQCP Partners commit their Effluent by January 31 of that year, this 50% of the Annual Option Payment will be allocated to Palo Alto and Mountain View for their use, at their discretion, for water supply related projects within their jurisdictions.

**8. Local Plant Project Management – Valley Water’s proposed language.
Palo Alto and Mountain View disagree with the principle of repayment.**

- a. If, for any reason within Palo Alto’s reasonable control, the Local Plant does not start operation within X years of the date of execution of this Agreement by the Parties, Valley Water shall have the right to recover from Palo Alto and Mountain View all of its contributions towards the Local Plant under this Agreement, plus interest at Valley Water’s Yield-to-Maturity Rate, except any amounts paid as the Annual Option Payment which shall not be recoverable by Valley Water. If the Parties are unable to reach agreement for reimbursement of the contributions, they shall follow the Dispute Resolution Procedure. If the Local Plant does not start operation within ten years of execution of this Agreement due to certain circumstances outside of Palo Alto’s control, this milestone may be extended at the request of Palo Alto for up to three years. The provisions of this paragraph shall not apply where Palo Alto and Mountain View have provided written notice to Valley Water that they will not proceed with the Local Plant as set forth in Article 6(d).
- b. If, for any reason under Palo Alto’s reasonable control and without prior agreement by Valley Water, the Local Plant, once beginning operation, does not meet the performance standards in the bid documents based on the Advanced Water Purification Feasibility Study (May 2017) for a specified period, Valley Water may request to negotiate a financial settlement between the Parties to compensate Valley Water for its share of funding for the Local Plant that does not produce the specified amount of water and/or water quality. The parties shall initiate Dispute Resolution Procedures in the event they fail to achieve a settlement.
- c. For purposes of this Agreement, reasons and circumstances outside Palo Alto’s reasonable control include the following: an act of God or public enemy; an act of civil or military authorities; a fire, flood, earthquake or other natural disaster; an explosion; a war or act of terrorism; an epidemic or pandemic; a national emergency; a strike; a lockout; a riot or civil unrest; a freight embargo; delays of common carriers; acts or orders of governmental authorities; impact of governmental statutes, regulations, permits or orders imposed or issued after the effective date of this Agreement; unavailability of required labor or materials; inability to obtain funding due to a financial crisis; a regulatory agency’s failure to issue a required permit or other approval despite submittal of a complete application; litigation not initiated by Palo Alto; and other similar circumstances or causes. If Palo Alto is required to take or forego certain actions to maintain

compliance with its NPDES permit and other regulatory requirements, such acts or omissions shall not be considered to be within Palo Alto's reasonable control.

- d. If the Local Plant does not start operation within thirteen years of execution of this Agreement, Valley Water may terminate this Agreement or may notify Palo Alto and Mountain View in writing of its intent to continue to provide the funding specified in Article 6 or Article 7 or both, or a portion thereof, for alternative Recycled Water projects in Santa Clara County rather than terminate this Agreement. Upon such notification, Valley Water shall provide the funding as specified in its notification and the Parties shall continue to implement the terms of this Agreement.

9. Reverse Osmosis Concentrate Produced by the Local Plant

Palo Alto is responsible for securing any necessary changes in its National Pollution Discharge Elimination System (NPDES) permit to accommodate reverse osmosis concentrate discharge from the Local Plant to receiving waters under the jurisdiction of federal and state agencies.

10. Local Plant Naming and Tours

- a. Valley Water reserves the right to name the Local Plant, including signage on site. Signage may be subject to approval by the appropriate Palo Alto decision maker or body, of which will not be unreasonably withheld.
- b. With 48-hour advance notice to the RWQCP plant manager or his/her designee, designated Valley Water personnel may lead tours of the Local Plant by Valley Water employees or members of the public. Valley Water-led tours shall be subject to prior and ongoing review by the RWQCP plant manager or his/her designee to ensure that the tours are conducted safely and with minimal disruption to other RWQCP activities, and that parking of private vehicles by tour attendees is consistent with RWQCP requirements. Valley Water will submit a plan or program for tours of the Local Plant for the RWQCP plant manager's review and approval, and shall conduct tours consistently with the approved plan or program.

11. On-site Research at the Local Plant

Valley Water may desire to conduct research work on treatment processes at the Local Plant, including installation of pilot test equipment. Valley Water-managed research teams may include personnel from RWQCP Partners, universities, private companies engaged in research, or other research laboratories. Palo Alto agrees that it will make its best effort to enable research at the Local Plant and to not unreasonably deny or constrain Valley Water proposals to conduct such research. Valley Water agrees to share results of such research with Parties, upon request. Such research work will not significantly disrupt operation of the Local Plant or the RWQCP, nor result in significantly decreased flows, RWQCP upsets, or permit violations.

12. Term of Local Plant Operation Valley Water's proposed language. Palo Alto and Mountain View disagree with the principle of repayment.

Palo Alto agrees to operate the Local Plant for a continual period of at least 30 years, unless the Parties agree to cease operations sooner.

In the event the Local Plant is not operated for 30 years but a shorter amount of time that Valley Water did not agree to, and the cessation of operation is due to a reason within the reasonable control of Palo Alto, Valley Water may request to negotiate a financial settlement between the Parties to compensate Valley Water for its share of funding for the Local Plant that does not produce the specified amount of water. Any reimbursement to Valley Water shall be limited to the capital cost contributed by Valley Water minus the accumulated depreciated value based on a project life of 30 years, compounded annually based on annual average (previous 12 months) of the CPI-All Items for the San Francisco-Oakland-Hayward, California area published by the United States Department of Labor-Bureau of Labor Statistics (<https://data.bls.gov/PDQWeb/cu>) plus interest at Valley Water's Yield-to-Maturity Rate, to calculate the future value of such payment.

SECTION C - Effluent Delivery to Valley Water

13. Effluent Transfer Option

- a. Valley Water shall have the right to exercise an exclusive Effluent Transfer Option to secure from Palo Alto and Mountain View (or from the RWQCP Partners in aggregate) a Minimum Flow Delivery of an annual average of 9 million gallons per day (MGD)(10,000 AFY), as described in Appendix 1, of Effluent. Valley Water's exercise of this Effluent Transfer Option shall be subject to CEQA review. Valley Water may elect to develop a Regional Plant to receive and treat such Effluent or may instead receive the Effluent for development of other beneficial use in Santa Clara County as part of its Regional Program.
- b. This Agreement shall not bind or commit Valley Water to any definite course of action with respect to the Effluent Transfer Option and shall not restrict Valley Water from considering any alternatives, including a no-action alternative, or requiring any feasible mitigation measures when considering whether to receive Effluent delivery.

14. Timing of Valley Water's Effluent Transfer Option

- a. Valley Water's period to exercise the Effluent Transfer Option and to accomplish Startup extends for thirteen years from the date on which this Agreement is executed by the Parties. Valley Water may exercise the Effluent Transfer Option by written notification by its Designated Representative to the Designated Representatives of Palo Alto and Mountain View. Before Startup, as needed, Valley Water and Palo Alto will work together to determine and provide adequate Effluent for testing and commissioning purposes.

- b. Notwithstanding Article 14 (a), Valley Water may elect to defer implementation of a Regional Program until after Startup. However, at any time after Startup, if Valley Water has not implemented a Regional Program and begun taking the Effluent, any Party may request to meet and confer among the Parties to determine an alternative use of the Effluent and amend this Agreement. After 10 years from Startup, if the Parties have not agreed to amend this Agreement and Valley Water has not begun taking the Effluent, the Agreement shall terminate.

15. Effluent to Valley Water if Valley Water Exercises its Effluent Transfer Option

- a. The Minimum Flow Delivery is defined as at least 9 million gallons per day (MGD) of annual average flow of Effluent that will be secured by Valley Water, predicated upon Valley Water exercising its Effluent Transfer Option, from Startup through the Term of this Agreement, consistent with the parameters described in Appendix 1. During the planning and/or design phases of a Valley Water project, Valley Water may identify one or more other Effluent flow parameters required for operation of said project. In this case, these flow parameters shall be developed consistent with RWQCP data provided by Palo Alto, and Appendix 1 will be updated accordingly with approval by Palo Alto's and Valley Water's Designated Representatives.
- b. If Valley Water exercises its Effluent Transfer Option, Palo Alto and Mountain View will take certain actions to increase the volume of Effluent delivered to Valley Water during droughts, described as follows: During water supply shortages caused by drought, Palo Alto will use best efforts to temporarily modify operations to maximize the volume of Effluent delivered to Valley Water, while complying with all legal and federal, state, and local regulatory requirements and completing any legally mandated environmental review. Such modifications may include temporary decreases to environmental flows. In addition, Palo Alto and Mountain View will implement the appropriate stages of their Water Shortage Contingency Plans and will use best efforts to reduce non-critical use of non-potable Recycled Water.
- c. Palo Alto will seek and make good faith efforts to sign separate agreements with remaining RWQCP Partners to commit their shares of Effluent to Palo Alto for delivery to Valley Water for a period consistent with the Term of this Agreement. Palo Alto will also make good faith efforts to work with the RWQCP Partners to modify the RWQCP Partner Agreements to be consistent with the termination date of this Agreement. Good faith efforts include sending letters to city manager and/or clerk of the city of Los Altos; the X of the East Palo Sanitary District; the town manager of the Town of Los Altos Hills; and the X for Stanford University. These letters shall be sent within 3 months of execution of this Agreement. If one or more of the remaining RWQCP Partners does not sign a separate agreement with Palo Alto within 12 months of execution of the Agreement by the Parties, or if such separate agreements contain only limited commitments (in amount or duration) of Effluent, Palo Alto and Mountain View will ensure that the 9 MGD Minimum Flow Delivery will be met through an alternative method or methods, which will be

immediately described by Palo Alto's and Mountain View's Designated Representatives in writing to Valley Water.

- d. Each year following Startup, Palo Alto and/or Mountain View will notify Valley Water by November 30 to determine what, if any, amount of Effluent will be available to deliver to Valley Water in excess of the 9 MGD Minimum Flow Delivery in the following fiscal year and to describe any conditions that may apply to such delivery. On an annual basis, by November 30, any commitments for delivery in excess of 9 MGD for the upcoming fiscal year shall be made in writing by the Designated Representatives of Mountain View and/or Palo Alto.
- e. At any time, the Parties' Designated Representatives may determine that the Minimum Flow Delivery can be increased beyond 9 MGD for a definitive number of years in the future within the Term of this Agreement. The Parties agree they will consider such increases at the request of any Party, and this Agreement may be amended to implement such increases.
- f. Subject to Article 15(a)-(b), Mountain View shall at all times receive sufficient Effluent to receive a minimum supply of 2.5 MGD of Enhanced Recycled Water and Palo Alto shall at all times receive a minimum supply of 1.0 MGD of Enhanced Recycled Water from the RWQCP. This supply shall supersede Mountain View and Palo Alto's obligation to meet Valley Water's Minimum Flow Delivery. Mountain View and Palo Alto shall make available the unused portion of their minimum Recycled Water flows to Valley Water.

16. Regional Plant Location

- a. If Valley Water pursues a Regional Plant as part of its Regional Program, it is the preference of the Parties to locate the Regional Plant in Palo Alto. As such, Valley Water and Palo Alto shall evaluate the feasibility of all potential locations in Palo Alto, including: within the fence line of the RWQCP; at the Measure E site; or a yet to be determined location. If it is determined by Valley Water that it is not feasible or economical to locate the Regional Plant in Palo Alto, the Effluent may be conveyed for reuse by Valley Water to another location. The point of delivery of the Effluent to Valley Water shall be at the RWQCP, or another location mutually agreed between Valley Water and Palo Alto.
- b. If Valley Water notifies Palo Alto that it intends to locate a Regional Plant in Palo Alto, Palo Alto shall cooperate with Valley Water in identifying ways to accommodate a Regional Plant to the maximum extent possible within the boundary of the RWQCP or adjacent to the RWQCP boundary pending siting evaluation results. Palo Alto will also cooperate with Valley Water as it explores siting an appropriate sized water tank, to balance inbound fluctuating flows and produce a steady flow for treatment. Valley Water shall negotiate with Palo Alto to share costs between Palo Alto and Valley Water for use of the RWQCP site, including modification of existing facilities, based on the guiding principle that

beneficiaries pay their shares of the costs commensurate with the benefits received.

- c. In the event that Valley Water determines that the Measure E site adjacent to the RWQCP facility is the best location for a Regional Plant, and no extenuating circumstances (including, but not limited to, any environmental impacts identified through CEQA review) have been identified by Palo Alto, Palo Alto's staff will recommend to Palo Alto Council that the Council place a measure on the ballot to allow this use. If a Regional Plant is located, at least in part, on the Measure E site, Valley Water may lease the land from Palo Alto at a rate based on the then-current zoning, anticipated to be for "public facilities." A separate lease agreement may be required subject to approval by the Palo Alto City Council or Designated Representative.
- d. Palo Alto and Mountain View agree to process expeditiously, in accordance with regular city processes, Valley Water's complete non-discretionary permit applications for a Regional Plant.

17. Regional Plant and/or Conveyance Facilities Ownership, Capital, Operation and Maintenance Costs

Subject to Valley Water exercising the Effluent Transfer Option, Valley Water may own and construct a Regional Plant and conveyance facilities to and from the Regional Plant (preliminary cost of \$300 Million based on a comparison of like projects), or conveyance facilities to take the Effluent elsewhere. Valley Water will be responsible for all capital and O&M costs for a Regional Plant and conveyance facilities.

18. Other Development Commitments by the Parties

- a. In the event that a Regional Plant is to be located in Palo Alto, Palo Alto shall accommodate Valley Water's chosen development and operation & maintenance (O&M) approach for the Regional Plant. Approaches under consideration by Valley Water include, but are not limited to, a design-build method with Valley Water responsibility for O&M; or a public-private partnership in which, for example, Valley Water may partner with one or more private entities to provide financing, design, construction, and O&M.
- b. Additionally, in the event that Valley Water notifies Palo Alto and Mountain View that it intends to develop a Regional Plant in Palo Alto, Palo Alto and Mountain View shall provide, when requested by Valley Water, written support to State and federal agencies to which Valley Water seeks grant funding or low-interest loans for the Regional Plant, and city staff shall participate in meetings with State and federal agencies for these purposes.
- c. The Parties to this Agreement anticipate that Valley Water will be the Lead Agency and Palo Alto and Mountain View will be Responsible Agencies under CEQA/NEPA for a Regional Plant. Any legally mandated environmental review

shall be completed prior to approval and development of the Regional Plant. The Parties shall work together to facilitate compliance under CEQA (and NEPA if applicable) for the development of the Regional Plant. As part of this process, the Parties agree to provide timely notice, review, and responses.

19. Annual Payments for Effluent

- a. Upon Startup, Valley Water will pay Palo Alto \$1,000,000 per year for the Minimum Flow Delivery, consistent with Articles 13 through 15 and Appendix 1, during the Term of this Agreement. Valley Water shall make payments on a fiscal year basis (July – June). Following Startup, Valley Water's first payment shall be prorated based on Effluent received or, if the Regional Program is not yet implemented, shall be based on the Minimum Flow Delivery. Valley Water's payments will be made by August 31 for the preceding fiscal year. Palo Alto will allocate these funds to RWQCP Partners that have committed their Effluent to Valley Water by January 31 proportionally based on the RWQCP Partner's share of the total Effluent committed. The \$1,000,000 annual amount referred to in this Section shall be in 2019 dollars, adjusted July 1 of each year by the annual average (previous 12 months) of the CPI-All Items for the San Francisco-Oakland-Hayward, California area published by the United States Department of Labor-Bureau of Labor Statistics (<https://data.bls.gov/PDQWeb/cu>). If the quantity of Effluent requested by Valley Water and delivered to Valley Water falls below the Minimum Flow Delivery in a year, the payment for that year shall be prorated accordingly.
- b. Valley Water's payments for Effluent pursuant to this Article shall continue through the Term of this Agreement unless the Agreement is terminated earlier subject to Article 2. If the Agreement is terminated, Valley Water's payment for Effluent in the year it is terminated shall be prorated based on the termination date and the proportion of days lapsed in the fiscal year.
- c. If implementation of the Regional Program is deferred pursuant to Article 14 (b) and, during that period of deferral, Palo Alto incurs incremental wastewater treatment costs to meet new NPDES requirements, Valley Water shall pay Palo Alto a proportion of the annual operation and maintenance costs, not capital costs, for such incremental wastewater treatment based on the percentage of Minimum Flow Delivery relative to the total volume of wastewater effluent produced over that period. However, Valley Water's obligation to pay for annual operation and maintenance costs under this Sub-Article shall not begin until the five-year anniversary of Startup and shall cover the period after that date. Palo Alto shall invoice Valley Water, detailing the basis of the costs for the preceding year, after the end of the sixth year after Startup and each year thereafter until Valley Water begins to take delivery of Effluent or until the Agreement is terminated pursuant to Article 2. Valley Water's obligation to pay such costs shall be capped at \$150,000 per year (in 2019 dollars, adjusted July 1 of each year by

the annual average (previous 12 months) of the CPI-All Items for the San Francisco-Oakland-Hayward, California area published by the United States Department of Labor-Bureau of Labor Statistics (<https://data.bls.gov/PDQWeb/cu>).

- d. To the extent that the participating RWQCP Partners are able to deliver, upon Valley Water's request, Effluent in excess of the Minimum Flow Delivery, consistent with Appendix 1, Valley Water's payment to Palo Alto shall increase by a prorated amount.
- e. If the amount of Effluent Valley Water requests, up to the Minimum Flow Delivery, is not met, the Parties shall meet and confer for the purpose of identifying and implementing feasible solutions to any supply shortfall, including the potential to extend the Term of the Agreement to make up for lost Effluent delivery.

20. Reverse Osmosis Concentrate Produced by a Regional Plant in Palo Alto

In the event that a Regional Plant is located in Palo Alto, Palo Alto shall evaluate operating strategies and make best efforts to accomplish any necessary changes in its NPDES permit to accommodate reverse osmosis concentrate discharge from the Regional Plant to receiving waters under the jurisdiction of federal and state regulators. Palo Alto staff shall include Valley Water staff in its planning and negotiations with the regulators. To the extent that discharge of the reverse osmosis concentrate to receiving waters via Palo Alto's wastewater outfall is not feasible and acceptable to the regulators, Valley Water shall evaluate and implement alternative reverse osmosis concentrate management measures acceptable to Palo Alto, if within the city's jurisdiction, and the regulators. Valley Water shall pay the costs of treating the reverse osmosis concentrate to meet requirements of Palo Alto's NPDES permit and any alternative reverse osmosis concentrate management measures. The Parties acknowledge that a separate agreement will be negotiated to address management of reverse osmosis concentrate.

21. Water Supply Option for Palo Alto and Mountain View

- a. Beginning one year from execution of this Agreement, Palo Alto or Mountain View or both shall each have an opportunity to provide Valley Water a notification of the need for additional water to meet demands in their respective service areas. The written notification shall include the amount of potable and/or non-potable water requested, up to the following maximum amounts: Palo Alto may request an annual average of up to 3.0 MGD and Mountain View may request an annual average of up to 1.3 MGD. The notification may also include an indication of a maximum cost for the water in the first year. Valley Water will make its best effort to develop a proposal that includes at least one supply within that maximum cost for the first year.

- b. Within three (3) months of receiving the written notification from Palo Alto and/or Mountain View, Valley Water will provide an estimate of the incremental costs to Valley Water to prepare a proposal for the requested water. Palo Alto and/or Mountain View will respond to Valley Water's cost estimate within four (4) months. After receiving written approval from Palo Alto and/or Mountain View accepting the estimated cost for Valley Water to do so, Valley Water will have up to four (4) years from receipt of the original request to prepare a water supply proposal to Palo Alto and/or Mountain View. Parties will meet periodically as requested by any Party during this four (4) year period to discuss the request and the proposal being developed. Valley Water's proposal will include a description of the water supply, including the cost, payment schedule, and any conditions related to the supply to the requester (Palo Alto and/or Mountain View). Valley Water will submit quarterly cost invoices for its work in preparing the proposal and Palo Alto/Mountain View will reimburse Valley Water within 30 days.
- c. Valley Water's cost estimate in its proposal shall be limited to Valley Water's costs, including all costs associated with the water supply, such as but not limited to: facility costs, commodity costs, and any wheeling fees. Valley Water shall not be required to subsidize the cost of the water in order to meet this maximum cost. The proposal shall include or allow for subsequent increases in cost after the first year based upon Valley Water's costs.
- d. The requester (Palo Alto and/or Mountain View) will have up to twelve (12) months from receiving Valley Water's proposal to provide written notification that they accept or decline this proposal, unless a shorter time period is one of the conditions required by Valley Water. For example, a shorter time frame may be required if Valley Water's proposal involves a fleeting opportunity with third parties in which a commitment is needed in less than 12 months. In the event that Valley Water prepares a proposal with a time period for acceptance of less than 12 months, it shall also, with Palo Alto's and/or Mountain View's concurrence, proceed to develop a proposal for which the acceptance time period is up to twelve (12) months.
- e. If Palo Alto and/or Mountain View does not accept Valley Water's proposal, Palo Alto and/or Mountain View may request a potable or non-potable water supply starting 5 (five) years from declining the previous opportunity. This sequence of proposals and potential denials, including the five (5) year period between the denial and the next request, can be repeated throughout the Term of the Agreement. Notwithstanding the minimum five-year interval between a proposal declined by Palo Alto and/or Mountain View and a subsequent opportunity to request a proposal, Valley Water shall not unreasonably deny a request by Palo Alto and/or Mountain View to develop a proposal for them after a period of less than five years since they declined a prior Valley Water proposal.

- f. If Palo Alto and/or Mountain View accepts Valley Water's proposal, Valley Water will have up to ten (10) years from the acceptance date to begin delivery of the water to the requester (Palo Alto and/or Mountain View) at cost. All water provided by Valley Water may only be utilized by Palo Alto and/or Mountain View within their service areas and Valley Water's obligation to provide the water to Palo Alto and/or Mountain View expires at the end of the Term of this Agreement or an agreed upon date. The Parties shall develop detailed terms and conditions for Valley Water's water supply delivery to them in a separate agreement, and shall provide environmental documentation to support CEQA findings, for approval by Parties' governing bodies prior to commencement of delivery of water to them under this Article. Such separate agreement may have a term that extends beyond the Term of this Agreement.
- g. If Valley Water determines Startup of the Regional Program will not occur within thirteen (13) years of execution of this Agreement and Parties have not agreed to further extend this timeline, Palo Alto and Mountain View shall no longer have the ability to request a potable and/or non-potable water supply from Valley Water.
- h. If Valley Water was delivering Article 21 water to Palo Alto and/or Mountain View when Valley Water determines Startup of the Regional Program will not occur within thirteen (13) years of execution of this Agreement and Parties have not agreed to further extend this timeline, Valley Water may notify Palo Alto and/or Mountain View that within five years it will no longer be supplying Article 21 water.

22. Mutual Benefits of this Agreement

Through execution of this Agreement, Parties agree to commit funding and resources to advance a locally controlled, drought resilient supply that improves water supply reliability and assists in maintaining local groundwater basins, to the benefit of all Parties. Additionally, the Parties seek to develop reliable water supply sources to minimize supplies of water that would otherwise have to be imported via the Sacramento-San Joaquin River Delta and its tributaries, including the Tuolumne River and other mountain streams.

23. Notifications

Palo Alto and Valley Water shall notify all RWQCP Partners of the existence of this Agreement within 30 days of its execution.

SECTION D – SALE OF RWQCP DURING TERM

24. Sale of RWQCP During Term of Agreement

Palo Alto agrees that it shall not sell or attempt to sell the RWQCP to any third-party unless Valley Water is first offered the right to purchase the RWQCP at fair market value to be determined by an independent third-party consultant qualified in the wastewater and/or water industry. Valley Water shall have six months after a fair

market value has been determined to consider this purchase, and Palo Alto may only pursue the sale to third parties following the expiration of this six-month period or receipt of Valley Water's written notice that it does not intend to purchase the RWQCP. Upon Valley Water's expression of intent to purchase the RWQCP, Palo Alto shall provide Valley Water with an additional twelve months to complete any financing necessary for the purchase.

25. Assumption of Agreement Obligations upon Third-Party Sale

The provisions of Section C herein (Effluent Delivery to Valley Water), shall survive any sale of the RWQCP to a third-party during the Term, and Palo Alto shall include as an express condition in the sale of the RWQCP to a third-party the requirement that the third party assume the obligations of this Agreement for the remainder of the Term. Valley Water shall constitute a third-party beneficiary to any agreement between Palo Alto and a third-party for the sale of the RWQCP.

26. Dispute Resolution Procedure

The process by which the Parties will attempt in good faith to resolve any dispute arising out of or relating to this Agreement, which will be undertaken promptly and initially by representatives of the Parties in the following manner:

- a) If a dispute should arise, an authorized representative for each of the Parties will meet or teleconference within fourteen (14) calendar days of written notification of the dispute to resolve the dispute. Prior to such meeting or teleconference, the Party bringing the dispute will draft and submit to the other Parties a written description, including any factual support, of the disputed matter. After receiving this written description, the other Parties will provide a written response to such written description within a reasonable period of time.
- b) If no resolution of the dispute occurs at this meeting or teleconference, the issue will be elevated to an executive-level manager of each Party (i.e. executive level manager for Valley Water and Assistant City Manager or higher-level executive for Palo Alto and Mountain View). Each Party's executive-level manager will meet or teleconference as soon as practical, but, in no event, later than twenty one (21) calendar days after the matter has been referred to them, with the initial meeting to occur at a location to be selected by the Parties.
- c) If the dispute remains unresolved after forty five (45) calendar days from their receipt of the matter for resolution, and any necessary Party is not willing to continue negotiations, the Parties agree to submit the dispute to nonbinding mediation.
- d) If the Parties are not able to agree on a mediator, any necessary Party may request the American Arbitration Association or other acceptable

mediation service to nominate a mediator. The Parties will share the cost of the mediator equally.

e) In the event mediation is unsuccessful, any Party may pursue other remedies available at law including filing an action in Santa Clara County Superior Court.

27. Audit.

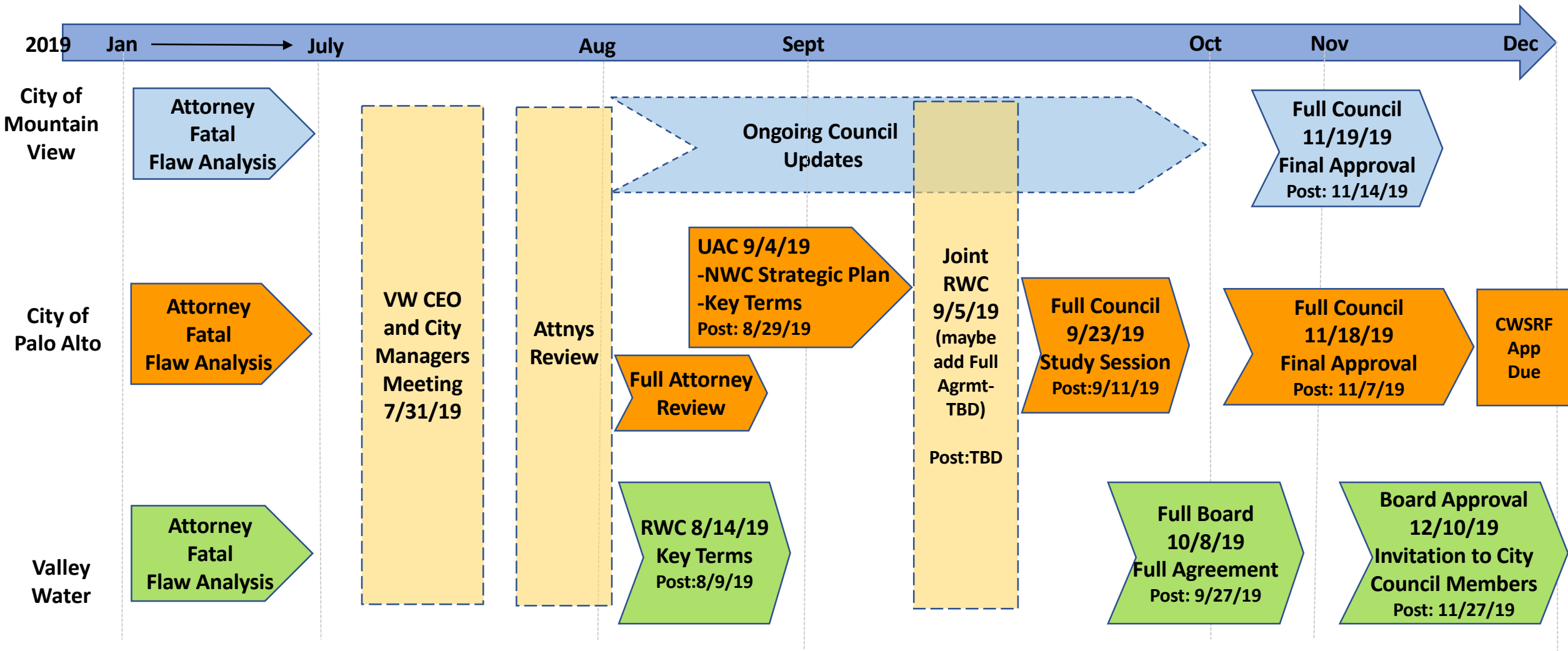
Valley Water shall have the right to conduct audits of Palo Alto and Mountain View to ensure that the funds paid by Valley Water under this Agreement are being used in accordance with all restrictions set forth in this Agreement. Palo Alto and Mountain View shall cooperate with any such audit and shall provide records requested by Valley Water within a reasonable amount of time.

DRAFT

This Page Intentionally Left Blank

DRAFT AGREEMENT SCHEDULE

Updated 7-31-19



This Page Intentionally Left Blank



Valley Water

Clean Water • Healthy Environment • Flood Protection

Update on Partnership to Expand Water Reuse

Joint Recycled Water Advisory Committee September 5, 2019



Valley Water's Water Supply Master Plan

3

- Comprehensive evaluation of project and program costs, benefits, and risks
- Ensure Sustainability Strategy
- Recommend projects such as water reuse
- Monitor and assess to avoid over investments



valleywater.org

Ensure Sustainability Strategy

4



valleywater.org

Proposed Agreement – Key Terms

Parties	Palo Alto, Mountain View, & Valley Water
Minimum Flow Delivery	9 MGD
Contract Term	Up to 76 years
Local Advanced Water Purification Facility	<ul style="list-style-type: none"> Owned & operated by Palo Alto to provide local recycled water for NPR To be located within the RWQCP site Valley Water to contribute \$16M of the \$20M project capital costs
Regional Program	<ul style="list-style-type: none"> Purified water facility managed by Valley Water at a location TBD Valley Water pays \$200k/year up to 13 years or until facility startup Valley Water pays \$1M/year for effluent initiating at Regional Program Startup

Proposed Agreement – Key Terms

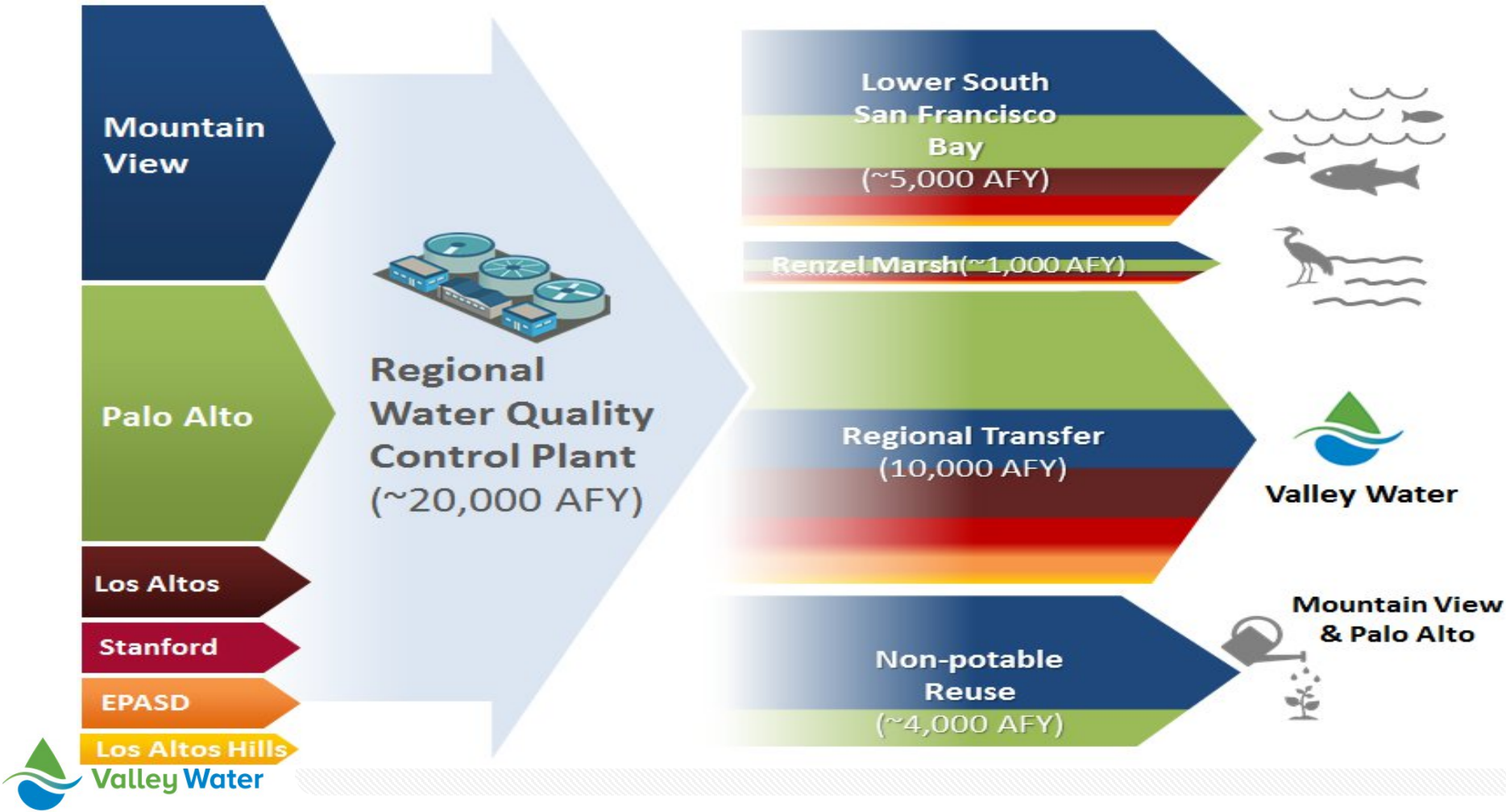
(continued)

Water Supply Option	<ul style="list-style-type: none"> • Palo Alto may request potable/non-potable water up to 3 MGD and Mountain View up to 1.3 MGD for local use after notice to Valley Water • Valley Water to provide a water supply option for acceptance by Palo Alto and/or Mountain View • Water supply to be available as early as 16 years after execution of this agreement • Palo Alto and/or Mountain View will reimburse Valley Water for requested water at cost • Water will be delivered within the Term of this Agreement
RWQCP	<ul style="list-style-type: none"> • If Palo Alto intends to sell the RWQCP, Valley Water has first right to purchase it at fair market value • This Agreement survives any sale of RWQCP to a 3rd party



Regional Transfer of Effluent

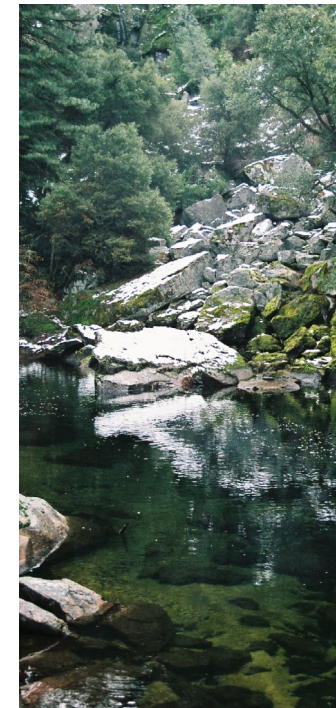
7



valleywater.org

Environmental Benefits of Proposed Agreement

- Reduces county-wide reliance on imported water
- Reduces water that must be taken from the Tuolumne River
- Improves quality of recycled water in Palo Alto & Mountain View for irrigation
- Reduces concentration of salt applied to the soil and, ultimately, groundwater
- Reduces RWQCP flow & pollutant loading discharged to San Francisco Bay



Next Steps

- Reach out to other wastewater providers:
August/September 2019
- Palo Alto Council Study Session: September 23, 2019
- Valley Water information only update to full Board:
October 2019
- Palo Alto Council Consideration of Agreement:
November 2019
- Mountain View Council Consideration of Agreement:
November 2019
- Valley Water Board Consideration of Agreement:
December 2019



Valley Water

Clean Water • Healthy Environment • Flood Protection



Santa Clara Valley Water District

File No.: 19-0821

Agenda Date: 9/5/2019
Item No.: 4.4.

COMMITTEE AGENDA MEMORANDUM

Joint RWPC with Cities of Palo Alto/E. Palo Alto/Mtn View

SUBJECT:

Next Meeting and Tentative Items.

RECOMMENDATION:

Discuss and confirm next meeting date and tentative items.

SUMMARY:

Review 2019 calendar for potential meeting dates in late 2019 or early 2020.

ATTACHMENTS:

None.

UNCLASSIFIED MANAGER:

Jerry De La Piedra, 408-630-2257

This Page Intentionally Left Blank

Handouts

This Page Intentionally Left Blank

The Transfer Agreement: What Palo Alto Cares About

Reliability

- **Low. Additional source of supply:** City council already acknowledged Bay Delta Plan was not a threat given numerous means to mitigate. If supply is a concern, a better solution is to choose an option with known costs rather than the unknown costs in the transfer agreement.

Funds

- **Low. \$1M/year.** Not significant relative to price of potable water.

Environment

- **High. Mitigate Tuolumne river devastation caused by Palo Alto's imports.** Not significantly addressed by transfer agreement. Instead Valley Water goes as far as opposing the Bay Delta Plan.
- **Medium. Effluent used to offset other water imports:** Not addressed by transfer agreement. Instead water could be used for projected Valley Water demand increases

Conclusion: *Unless the transfer agreement better addresses Palo Alto's priorities, other options better align with Palo Alto's values, including the "do nothing" option (keep options open)*

Please incorporate Palo Alto's environmental priorities